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Injuries to the Intervertebral Disc

Anatomic and Physiologic Considerations

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AS OUR knowledge of the intervertebral disc becomes greater, injuries of this structure will be increasingly recognized.* This necessarily must occur since the greater portion of spinal injuries and pathology involves the disc. The problem that faces us as clinicians is to recognize disc injuries which in the acute stage rarely show signs that are tangible but which later on can be demonstrated, especially by roentgen evidence. Persistingly lame or sore backs or the painful low backache described by the orthopedist are not always due to muscular or ligamentous injuries alone but, if submitted to roentgen investigation two or three months following the injury, much useful information relative to the disc will be obtained in a surprisingly large number of cases. Of course this does not apply to fracture or dislocation of the vertebral body which is readily recognized in the greater majority of cases. However, in compression fracture of the body the disc is involved in over 80% of cases. Involvement of the disc also aids us to recognize small fractures of the body which in contour reveal minor changes and which later on present protrusions of the nucleus pulposus into the spongiosa of the body. Further mention of this will be made in other parts of this paper.

The recognition of the role of the intervertebral disc as a common factor concerned in injuries and diseases involving the vertebrae is now commencing to appear in the literature. Anatomic, physiologic and pathologic investigations and research have made this structure increasingly important, discovering many obscure conditions in the past as due to structural changes in the disc. Many cases of low back pain, complications following spinal puncture wherein the nucleus pulposus of the intervertebral disc is injured, frequent etiological factors of osteoarthritis of the spine, some cases of compression of the spinal cord and some diseases and injuries of the spinal joints and vertebrae are in great part due to involvement of the central portion of the disc—the nucleus pulposus. It is now held, in fractures of the vertebral body, that the disc is involved in about 80% of cases. This will be readily understood since this percentage comprises compression of the body, and in the mechanism of injury the disc is also compressed, resulting in extrusion of the nucleus pulposus substance. Obviously, the cartilage plate and the layer of annulus fibrosus—structures which surround the nuclear material and which enclose it—are injured and the nuclear fluid escapes into the spongiosa of the body and surrounding structures. To make more comprehensive the pathology involved in the disc a brief review of the anatomy and physiology is essential and will be discussed later.

Knowledge of the intervertebral disc is as old as anatomy itself. Vesalius in 1555 described it as a "fibrocartilaginous, tough ligament with a soft center". The textbooks have little to classify this pathological process as a distinct entity. In fact, this structure merits more of our attention as a spinal pathologic condition which, astonishingly as it may seem, constitutes about 38% of spinal injuries, according to Schmorl. He routinely sectioned all spine cases coming to autopsy and found that in this percentage there was an extension or prolapse of this nuclear material (nucleus pulposus) into the adjacent spongiosa of the vertebral bodies[1]. We are greatly indebted to this man, a Dresden pathologist; he first described this condition in 1926. Later other workers were able to correlate the pathological findings in the disc with the clinical picture.

Anatomy

THE intervertebral fibrocartilage may be considered as an elastic buffer placed between the bodies of the vertebrae from the axis to the sacrum and forms the chief bond of connection between these bones. There are 23 in number. In shape and size they correspond with the surfaces of the bodies between which they are placed, and are oval in the cervical and lumbar regions and circular in the thoracic. They are thicker in front than behind in the cervical and lumbar regions, while uniformity of thickness prevails in the thoracic zone. The discs form about one-quarter of the vertebral column exclusive of the first two cervical. Unequal distribution of quantity as to length is seen in the thoracic region which has the least, the greater amount occurring in the cervical and lumbar zones which give rise to the latter region's greater pliancy and freedom of move-

* From X-Ray Department, Woodlawn Hospital, Chicago; presented at the Annual Meeting of the Central States Society of Industrial Medicine and Surgery, May 18, 1937, at Peoria, Illinois.

ment. As age advances the discs become thinner and loss of their substance is responsible for diminished body height.

Three main components comprise the structure of the disc: (1) the annulus fibrosus, the enveloping outer portion; (2) two thin cartilage plates adherent above and below, confining the nucleus pulposus; (3) a central, soft, pulpy, fibrogelatinous material of yellowish color which rises considerably above the surface when the disc is divided horizontally. The outer layers of the disc are arranged of concentrically placed fibrous tissue, but the others, which are most numerous, consist of white fibrocartilage, the fibers for the most part presenting a letter "X" arrangement. The pulpy substance has no concentric arrangement but consists of a fine, fibrogelatinous material containing cartilage-like cells which, united, form a nucleus pulposus at the expense of the elastic annulus fibrosus; in other words, the incompressibility of the central core of the disc exerts a function of transmitting the static and muscular forces from one vertebral body to another and establishes it as the axis of motion upon which each vertebral body must work.[3]

Fig. 1. Intervertebral disc with adjacent vertebral bodies, from in front. Note intervertebral adherent cartilage plates to body. (From Gray's Anatomy, p. 269)

Fig. 2. Median section of a piece of the lumbar vertebral column; right half of section viewed from the left (Spalteholz). Note nucleus pulposus and arrangement of fibers surrounding it. (From Gray's Anatomy, p. 270)

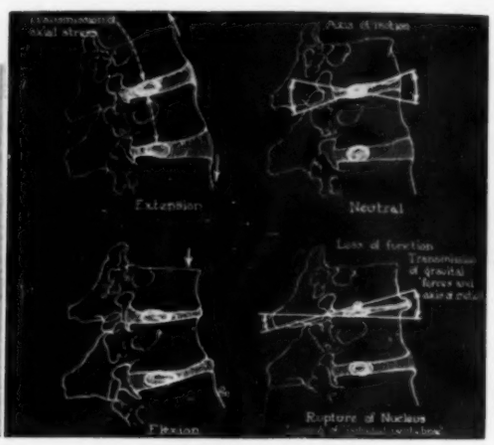

Fig. 3. Function of disc — normal physiology. (From Keyes and Compee: Roentgenological Studies of the Intervertebral Discs; Am. J. Roentgenol.; June, 1933)

reticular structure. The mature disc contains no blood vessels or nerves and derives its nutrition mainly from the lymph stream. (Figs. 1 and 2).

Function of the Intervertebral Disc

IT HAS been stated that the disc acts as a buffer between the bodies of the vertebrae, subject to pressure strains and stresses, changing considerably in shape with the position of the neighboring bodies. The nucleus pulposus, composed of fibrogelatinous material, is subject to the law of fluids and, being incompressible, is able to shift its position as the spine moves backward, forward and sideways in flexion, extension and lateral movement. The confinement of the central fluid material is dependent upon the integrity of the strong and elastic annulus fibrosis which surrounds it. (Fig. 3). The elastic tension of the annulus fibrosus, the pressure of which extrudes the nucleus pulposus material, is also aided by the muscle tone and static stresses from one vertebral body to the next. These forces combined with the spinous ligaments and ligamenta flava have a tendency to create an equilibrium which is expressed in the normal, physiologic curve of the spine. According to Steindler[2], the ligaments and discs impart to the vertebral column an enormous amount of resiliency and resistance, the discs in the main exerting a "shock-absorber" effect on the entire column. Therefore, any compression of the disc must result from a change in shape of the

Movements of Spine

THE movements of the spinal column are flexion, extension, lateral movement, circumduction and rotation. In flexion the part played by the intervertebral disc is compression in front with stretching of the posterior common ligament, ligamenta subflava, as well as the posterior fibers of the intervertebral disc. In extension or movement of the spinal column backward, an exactly opposite disposition of parts occurs. The intervertebral disc is compressed posteriorly while stretching of the anterior spinal common ligament and the ligamenta subflava takes place; the posterior spinal ligaments are relaxed. In lateral movement the sides of the intervertebral discs are compressed, the extent of motion being limited by the resistance offered by the surrounding ligaments and by approximation of the transverse processes. Circumduction is limited and is confined to a succession of the preceding movements.

Rotation is produced by the twisting of the intervertebral substance, movement which is only slight between two vertebrae but produces a larger range of motion when performed by the whole column. Thus we have a ball-bearing and socket arrangement capable of producing a wide variety of motion from a central core or disc—the nucleus pulposus.

Pathology

IF ONE constantly keeps in mind that the nucleus pulposus is a ball-bearing, incompressible structure located in the interior of the disc and the position of which is maintained by the annulus fibrosus and the two cartilage plates, the pathological process will be readily understood. Any injury or disease process which invades the cartilage plate or annulus fibrosus and permits any

portion of the nuclear material to escape will cause a comparative loss of function of the spine, the impairment depending upon the extent of injury. This loss of function must necessarily occur since the disc is the medium of transmitting pressure from one vertebra to the next in movements of the spine. However, very minute ruptures of the thin cartilage plate and small extrusions of the nuclear material may not cause pain in the back and disability, symptoms such as would be anticipated.[3]

Schmorl concluded from his studies that the nuclear prolapses which he found in 38% of the spines examined at postmortem were of little clinical significance, but he only reviewed five histories of the patients who were autopsied in his institute. Beadle[4] suggested the course of the pathological processes from his observations of a rounded by sclerosed bone. The mere presence of these cartilaginous nodules may not cause pain. It has been found experimentally and confirmed by clinical observations that a minimum of six weeks must elapse before sclerosis of the wall of the nodule can occur.

Sclerosed bone surrounding the nodule may be seen on the x-ray film. However, sufficient time must elapse following the prolapse of the nuclear material of the disc for bone reaction to occur, and until this takes place the roentgen diagnosis cannot usually be made. The nodule is manifested on the roentgenogram by a punched out excavation of bone, usually round but may assume other shapes as a concavity, deep or shallow, and varying in size from the head of a pin to the tip of one's thumb and larger. In one of the author's cases these three types of Schmorl's node were found.

Fig. 4. Note punched out excavations in bodies of L 2, 3, and 4, — typical Schmorl nodes. (See Case History No. 1)

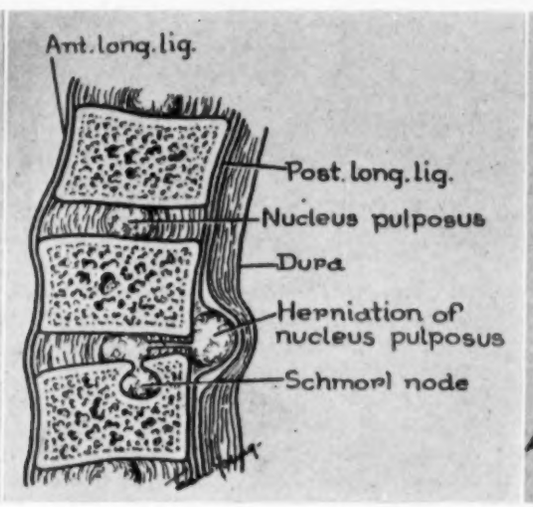

Fig. 5. Production of a Schmorl node. Note that protrusion of nucleus may occur into any portion of body or backward into spinal canal. From Peet and Echols: Arch. Neurol. & Psychiat., November, 1934)

Fig. 6. Compression fracture, body L I at arrow. Injury to discs two above and one below. Old osteoarthritis. Note deep excavation of body and narrowing of discs. (See Case History No. 2)

number of certain spinal deformities, but the function played by the nucleus pulposus lesions themselves has not been interpreted on a satisfactory basis. Jung and Brunschwig, who recently studied the innervation of the articulations of the vertebral bodies, have exhibited sensory nerves in the anterior longitudinal ligament, but no nerve tissue in the intervertebral disc was found. Therefore, these authors conclude that trauma or disease affecting the disc can produce subjective symptoms only in proportion to the degree to which the adjacent structures are involved.[3]

Roentgen Diagnosis of Nucleus Pulposus Injuries

THE commonest lesion of the spine is prolapse of the nucleus pulposus, according to Schmorl, and this finding is corroborated by other investigators. This prolapse invades the spongiosa of the vertebral body and causes the formation of a node, named by other workers as a Schmorl node. An injury may cause a crack or defect in the vertical plate and outer disc layer and the nuclear material is forced into the spongiosa by the transmitted body weight to that disc aided by the tone of the spinal muscles and ligaments. This invasion into the spongiosa sets up a reaction in its substance and the semi-fluid material is transformed into a cartilage nodule soon to be sur-

The significant history of violent muscular strain (stooping over and suddenly sneezing) was described by the patient as something "snapping in her back" attended with severe pain, impairment of function and inability to straighten out her back. However, it is believed that the patient sustained previous back injuries to have caused the production of the other two disc injuries (prolapse of the nucleus pulposus). These punched out areas are surrounded by a wall of thickened density which is sclerosed bone. The joint space is narrowed and uneven, due to thinning of the disc. (Fig. 4, Case I).

If small portions of nuclear material are extruded, little or no disability may occur. The extrusion, however, of minute portions may lead to avenues of dehydration and thus cause impairment of function. Pusch and other observers have noted these phenomena. On the other hand, large or moderate amounts of nuclear prolapse cause the disc to become thin and it may finally disappear, totally destroyed. In addition, by constant weight-bearing pressure which the discs normally assume, this function is transferred to the articular facets and in flexion or lateral motion to the bodies (anterior and lateral margins). As a result the adjacent vertebrae may undergo sclerosis with the formation of spurs and lipping

and osteoarthritis is evidenced in the roentgenograms. Disease processes such as tuberculosis, neoplasm or even softened or crushed vertebrae from trauma will indirectly include the disc. Attempted repair will cause greater sclerosis and greater spinal deformity. In some cases of trauma slight kyphosis will gradually develop if no regeneration of the disc takes place. Pain may appear in the nerve roots because of the diminished size of the foramina through which the roots emerge due to collapse of the disc followed by overlapping of the articular facets. Cases in which severe pain and kyphosis are present may necessitate a fusion operation to produce ankylosis for relief of symptoms.[11]

Prolapses of the disc may occur in any direction —forward, backward or laterally. If backward, the herniation may extend into the spinal canal and simulate extradural cord tumor[5] or radiculitis if the nerve root fibers are involved. The recognition of a protruded disc into the spinal canal only causes narrowing of the intervertebral space in a small proportion of cases.

The roentgenologic diagnosis and localization of this type of protrusion depends upon the use of a radio-opaque oil injected into the spinal canal, since a narrowing of the disc may be the result of degeneration and fibrosis of the disc itself without herniation.

Clinically, the diagnosis of the protruding disc into the spinal canal is not a simple matter, and may offer much difficulty for recognition. An uncanny suspicion of its presence on the part of the examiner probably offers the most hopeful clue for its detection. A protruding disc into the spinal canal, as has been mentioned, may masquerade under the guise of a sciatica, neuritis or a typical cord tumor, and a very careful history elicited from the patient as to injury is of immense value; for instance, such a case is reported in the staff proceedings of the Mayo Clinic wherein a man lifted a box weighing 55 pounds, which was followed by severe pain in the right lower extremity. About six weeks following the injury the pain became unbearable at times. The patient had not been able to work since the onset of pain, which progressively became worse on standing or walking although relieved when lying in the recumbent position. Various forms of therapy did not relieve him of his distress until the protruded disc was removed through a laminectomy wound. Diagnosis was only made possible here by lipiodal injection into the canal. The neurologic surgical section selects patients under the following considerations: (1) patients are selected who have pain following the distribution of one or more spinal nerve roots over a long period of time and who have not responded to the usual measures of therapy; (2) wherein the cerebrospinal fluid obtained on lumbar puncture yields more than 40 mg. of total protein per 100 cc. of fluid; must react positively to globulin test, although the 40 mg. value does not exclude presence of protruded disc with nerve root compression; (3) reversed Queckenstedt test, which is considered very valuable by them. The method consists of placing a caudal needle in the sacral hiatus (care being taken not to enter vein or abnormally low dura mater). A lumbar needle is then inserted into the canal, a manometer is attached and 10 cc. fractions of 1% solution of procaine are injected into the caudal epidural space through the caudal needle. A progressive rise should normally occur in the manometric readings as the caudal sac is compressed by the extradural procaine. Four fractions of 10 cc. each or a total of 40 cc. of 1% procaine are injected extradurally. If a tumor or a protruded disc of sufficient size to obstruct the caudal sac is present, no increase will occur in the manometric reading. A "block" on reversed Queckenstedt test will have been established. In cases of ordinary sciatic pain not caused by pressure on the caudal roots by tumor or protruded disc, the sciatic pain is usually exaggerated at first and then subsequently relieved on injection of each fraction. Compression from tumor or disc causes unbearable pain and the epidural injection will necessarily have to be discontinued. This reversed Queckenstedt test is considered by them pathognomonic of a mass invading the region of one or more caudal roots. They believe laminectomy to be the only therapy once the diagnosis of protruded disc has been established and that it corresponds to the level of the root pain. Discs may be extruded also without production of pain.[12]

The backward prolapse may result in compression of the spinal cord. Peet and Echols have recently reported 50 cases of nodules surgically removed from the discs, half of them having been diagnosed as chrondroma or fibrochrondroma. These nodules were found to be herniation or prolapse of the nucleus pulposus and not new growths. The authors considered the lesion a distinct pathologic entity. These authors present two cases. In the first case lateral roentgenograms showed a narrowing of the disc from which the nuclear material herniated. Besides, the adjacent vertebral body presented a rarefied area which demonstrated that some nuclear substance had also ruptured into it. The authors concluded that if a clinical diagnosis of compression of the cord has been established and if there is evidence of a diseased intervertebral disc at the proper level, retropulsion of the nucleus pulposus should be considered. (Fig. 5). Geist,[7] Sashin,[8] and Beadle[4] have reported a number of pathological conditions in which the intervertebral nucleus pulposus is either primarily or secondarily involved. Calvé and Galland in 1922 described calcification of the nucleus pulposus.[9]

The accompanying table is presented in an at-

CLASSIFICATION OF DISC PATHOLOGY

PRIMARY:
Trauma—acute or chronic, involving the cartilage plates and annulus fibrosus.
Lumbar puncture accident.
Some fractures of the body causing escape of the nuclear fluid into adjacent vertebral bodies.
Spinal compression of cord from Schmorl node or tumor.

SECONDARY:
80% of fractures of the vertebral bodies.
Tuberculosis.
Osteomalacia.
Malignancy—
Primary.
Metastatic.
Paget's Disease.
Spinal joint infections — typhoid, pneumococcus, pyemia, etc.
Extension from adjacent infectious processes.
Congenital failure of closure at site of notochord.
Pressure on nerve trunks emerging from spinal foramina causing pain along course of nerve—intercostal thorax, lumbar nerves in the lumbar region, etc., simulating neuritis in some form.
Some cases of scoliosis.

tempt to classify the primary and secondary lesions which may produce pathology involving the nucleus pulposus material of the intervertebral disc.

The nucleus pulposus may be shifted in any direction—forward, backward or laterally. Backward retropulsion has been metioned. These movements change the center of axis of motion and necessarily disturb the balance of the vertebral column. In scoliosis the nucleus has been found shifted on the side of the convexity curve. Schmorl was unable to discover any evidence that this was the cause of scoliosis, but some authorities believe that the shift of the non-compressible nucleus may be the reason of much of the difficulty encountered in attempts to correct the lateral curvature. In every large orthopedic clinic cases are relatively common in which the intervertebral discs are primarily or secondarily involved. Good lateral roentgenograms will usually demonstrate the lesions in most instances.[3]

Fractures and Dislocations of the Vertebral Body

IT IS well recognized that the mechanism causing fractures of the vertebral bodies results in compression. Therefore, the vertebral body, being compressed, results in disintegration of the spongiosa and involves the intervertebral disc in such a manner that the nuclear material is extruded from the disc.

Schmorl found at autopsy cases of compression fracture un-united because of extension or invasion of pulpy material into the defect and the formation of a non-ossifying cartilage body. This may account for many cases of fibrous or non-bony union with consequent deformity of the body and changing the position of the vertebral column.

The role played by the disc in osteo- or degenerative arthritis may be the result, as considered by some authorities, of repeated trauma to which almost all of us are daily subjected. Fluid loss through the open avenues of these minute defects would lead to the dehydration of the discs and produce a progressive decrease in the normal function of the spine. The constant wear and tear on the vertebral bodies would be the result of the progressive narrowing of the discs. These changes eventually lead to sclerosis of the adjacent surfaces while the anterior edges of the vertebral bodies develop spur formation or lipping with resulting bridge formation of some of the margins of the bodies, changes commonly seen in osteoarthritis of the spine. I do not wish to infer that this is the sole etiology of osteoarthritis of the spine but it is probably one of the common factors in its production. In a similar way dislocation of the bodies through trauma and subsequent pressure may cause thinning of the disc with subsequent extrusion of the nuclear material and the changes which follow this event.

Experimental Studies of the Intervertebral Disc

EXPERIMENTAL studies on dogs by puncturing the disc by means of chisels, drills or scalpels have produced similar changes as have been found clinically in the human. Some of the dogs were subsequently killed and the pathological specimens studied were found to have the same changes in the dogs' vertebral bodies as found in pathological changes as first discovered by Schmorl and other investigators. In every instance where the nucleus pulposus material was allowed to escape, there was definite narrowing of the intervertebral disc. When most of the nucleus was curetted out the adjacent vertebrae showed early changes of hypertrophic or osteoarthritis of the spine.[3]

In one of the meetings I recently attended a paper was presented which showed injury to the nucleus pulposus of the disc and adjacent margins of the vertebral bodies caused by lumbar puncture in children, and x-rays submitted revealed these changes some time after the puncture. Narrowing of the disc appeared to be a common finding on the roentgenograms.[10]

The several illustrative cases demonstrate involvement of the nuclear material of the disc and in compression fracture of the vertebral body. In this group is included one case showing a typical Schmorl's node.

Case Histories

CASE I—Mrs. H. B.; No. 25366; age 22; admitted Woodlawn Hospital 5/31/36. Patient was dressing in a hurry and while bending over suddenly sneezed. She felt a sharp pain in region of the 4th lumbar and became dizzy. Unable to straighten out because of stitch-like pain. Tried massage and exercise to no avail, and then went to bed. Developed a facial paralysis next morning for which she was admitted. Then had recurrence of back pain which was investigated.

Roentgen Findings: Old injury, body of 5th; Schmorl's nodes in bodies of 2nd, 3rd, and 4th lumbar. Osteoarthritis.

Clinically: Increased obliquity, lumbar region. Spasm of muscles, pain and tenderness.

Comment: This patient had undoubtedly several or more back injuries than the one above mentioned although she never consulted her physician until the facial paralysis intervened, a coincidence which made her more concerned about her face than the low back pain. No history of her previous back injuries was obtained during hospital stay of 48 hours. (Fig. 4).

Case II—John C.; No. 18192; age 39; admitted Woodlawn Hospital 12/27/33. Fell from a ladder a distance of eight feet and landed on buttocks.

Roentgen Findings: Compression fracture, body of first lumbar; injury to disc above and two below. (Fig. 6).

Summary

A REVIEW of the literature reveals that the commonest lesion in the vertebral column is that involving the intervertebral disc. This finding is corroborated by clinical, experimental and research studies of other workers and by the writer in his analytical study of 56 hospital cases. In the writer's opinion this is a distinct, pathologic entity, and to Schmorl we are greatly indebted for placing this common injury on a well established, pathological basis with its clinical findings. Extrusion of the nucleus pulposus of the intervertebral disc, associated with disc injuries or disease involving the intervertebral body, whether by congenital defect, trauma, tumor, Paget's disease, osteomalacia, tuberculosis or extension from various pathologic processes is a common finding. The very nature of the anatomic construction of the disc and its close bond to the vertebral bodies and ligaments with its ball-bearing function subject these parts to daily trauma, hence its common occurrence in spinal injuries. Some

authorities claim that in fractures of the vertebral bodies the disc is involved in over 80% of cases. In a study of 50 cases of fracture of the vertebral bodies the author found 42 in which there was involvement of the nucleus pulposus of the disc—a percentage of 84. Furthermore, the nucleus pulposus is not infrequently injured in simple routine lumbar puncture. Lateral roentgenograms, carefully executed, will usually disclose the pathology.

It appears paradoxical that an injury so common to the spine has escaped recognition in the past. Today, diagnosis, while much improved, is still made rather infrequently.

Lastly, we must consider this entity as a working factor in the production of osteoarthritis and in some cases of low back pain.

Hospital Cases

FROM May, 1928, to January 1, 1937, there have been admitted into Woodlawn Hospital 27,525 cases of which 56 were fractures of the spine, including one fracture dislocation of the cervical region. The following table represents the location of the fractures in the various regions.

Region	Body	No. of Cases	Compression Involving Disc
Cervical	IV	1	1
	V	2	2
	VI	2	2
	VII	1	
	Total	6	5
Dorsal	IX	2	1
	X	3	2
	XI	3	3
	XII	7	7
	Total	15	13
Lumbar	I	10	8
	II	9	9
	III	4 (1 old)	3
	IV	3 (1 old)	2
	V	3 (1 old)	2
	Total	29	24

Table Summary:

Region	Total	Compression Involving Disc
Cervical	6	6
Dorsal	15	13
Lumbar	29	24
Total	50	42

The percentage of compression fracture involving the nucleus pulposus of the intervertebral disc is 84.

Of the total 56 spinal fractures, six were of the transverse processes alone. The group of 50 also included one Paget's disease, two involving the spinal cord and one fracture dislocation of the cervical spine and one compound fracture of the body of the second lumbar. Included in this group of 50 were other miscellaneous injuries as fractures into the sacro-iliac joint, hip joint, multiple pelvic fractures, fractures into the isthmus, articular facets and fractures of the spinous processes.

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Hyperpiesis and Respiration

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HYPERTENSION is the term almost universally, though somewhat erroneously, used to denote an increase in blood pressure. Derived from both Greek and Latin—"hyper" meaning over and "tendere" meaning to stretch—the true significance of hypertension would be an over-stretching. Since this is not exactly the intended meaning in relation to high blood pressure, the more proper appellation should be "hyperpiesis", derived from two Greek words — "hyper" meaning over and "piesis" meaning pressure.

The association of high blood pressure with arteriosclerosis is not constant. Conversely to a positive Wassermann being accepted as indicative of a syphilitic infection, the finding of a hyperpiesis does not necessarily indicate the presence of arteriosclerosis. The disease is generally, if not always, accompanied by an increase in blood pressure, while only a very small percentage of persons exhibiting a blood pressure increase are found to be arteriosclerotic unless the elevation in pressure has been long maintained.

Hyperpiesis, long continued, keeps the elasticity of the blood vessel walls in a state of overwork as a consequence of which a deposit of calcium salts takes place in the damaged portions of the interma or media, with a resultant rigidity of the vessel walls. Thus, high blood pressure, if long continued, is ascribed as being one of the etiological factors in the development of arteriosclerosis.

It is now generally conceded that any disturbance in the physiological economy registers a change in blood pressure. Aside from disease and traumatic conditions there are many variations in daily life which are followed by a transient increase in blood pressure; among these may be mentioned eating, fear, fright, anxiety, posture, elation, and many others. The hypertension aris-

ing from these etiological sources is thought to follow a stimulation of the super-renals and soon subsides, the blood pressure finding its individual norm.

Recently the relationship between two physiological factors, respiration and blood pressure, has received consideration, resulting in the unanimous conclusion that inspiration and expiration both exert a marked effect upon the circulation and particularly as regards the blood pressure.

Starling demonstrated that the capillary bed in the lungs constituted an enormous "depot" for blood storage, and in 1928, Blumgart and Weis determined this "depot" to contain 21% of the total circulating blood volume. Since the blood from this pulmonary capillary bed empties into the left side of the heart, it is at least theoretically correct to assume that by increasing the capacity of this blood storage "depot" there will result a retardation in the amount of blood returning to the left heart and a consequent reduction in the quantity of blood passing into the aorta with each systole. A reduction in blood pressure consequently ensues, which Vincent and Thomson demonstrate to occur to an extent of as much as a 25% drop in normal human beings.

Deep breathing, by its inspiratory effort, tends to increase the capacity of this blood "depot", and when it is realized that a normal human being will experience some 25,000 respiratory cycles in a day, the end result in its effect upon blood pressure may be appreciated. In proof of the theory that deep breathing tends toward a reduction in blood pressure, Tirala had 100 persons—accustomed to deep breathing (singers)—examined in Munich without finding a single one of these persons exhibiting symptoms of high blood pressure.

In 1929, Rappaport attempted a practical application of pulmonary distension, which was given the name of "hyperventilation", in the treatment of patients suffering with high blood pressure. These deep breathing exercises are reported to have resulted in beneficial effects in some cases. He instructed the patient to slowly and gradually expand the lungs for periods of not more than five to seven minutes at a time, and not more frequently than four to six times a day. He called special attention to the fact that "breathing exercises that make the patient work are doomed to failure".

Macleod, in his physiology and biochemistry in MODERN MEDICINE (1930), refers to increased inspiration as being of benefit in the reduction of high blood pressure. Berljaud and Weinsteen have made experiments along these lines and in some instances substituted oxygen for the deep breathing of ordinary air. They report 23 cases out of 25 to have shown a considerable reduction in blood pressure after treatments extending over a period of from 10 to 14 days.

Tirala says: "I have recognized insufficient respiration to be the genuine causal agent of hypertonia. Through systemic respiratory exercise I have succeeded in bringing back to normal the remarkably high blood pressure, the main symptom of hypertonia." He claims these results to have been secured after three to six weeks of treatment exercises.

Beckman, in his second edition of TREATMENT IN GENERAL PRACTICE, states that deep breathing should be considered as a rational attempt at physiologic therapeutics with reference to hyperpiesis and recommends that it is worthy of further trial. He calls attention however, to the fact that hypertensive persons are generally of a hyper-reactive personality and that if they know that certain exercises are directly designed for the purpose of lowering their blood pressure, the efforts are likely to fail.

IT IS by no means intended even to intimate that shallow breathing is or can be responsible for all cases of hyperpiesis. In fact, earlier in this thesis, mention was made of diseases, traumatic conditions and variations in daily life being causative factors. Many idiopathic cases of increased blood pressure, however, are encountered wherein no etiological underlying factor is ascertainable by any of the diagnostic means at our command. These may be looked upon as possible cases wherein shallow breathing alone may be the causative agent of the manifestation.

Regardless of the underlying cause producing the hyperpiesis, it is a well recognized fact that whatever will increase the total vascular capacity of the body will result in an alleviation of the increased blood pressure. Unfortunately all the pharmacopeial aids at our command are merely transient in their action and hence can afford only momentary relief. Not so with the physiological therapy of increasing the blood storage "depot" in the lung capillaries. Deep breathing will bring about this capillary increase, and when regular deep breathing is persisted in and becomes a regular habit, this increase will be maintained. No matter what the underlying pathological cause of the increased pressure may be, the dangers attendant thereupon will be minimized if not, in mild cases at least, totally removed.

Reference has already been made to the fact that Tirala demonstrated professional singers to be free from hyperpiesis or as he terms it "hypertonia". Practice has already developed the lung capacity in these persons and increased their capillary blood content. Should they develop an increased blood pressure some definite pathological causative agency must be held responsible therefor.

Singers are not alone in this class. Persons who regularly practice outdoor sports, those who work out-of-doors and increase their respiratory effort by muscular exertion, as well as many others, would fall into the same category.

There are millions of persons, both male and female, who lead lives and conduct their daily labors in such a manner as to favor a decrease rather than an increase in their lung capacity. Reference is made to those whose occupation is entirely or largely sedentary: Executives, bankers, professional men, clerks, stenographers, many mill operators, employees actually engaged in many manufacturing occupations, and a vast army of others too numerous to attempt to enumerate. Most of these are seated at a desk, counter, machine, or what have you, for the largest portion, if not all, of their working day. They sit in any way and upon any kind of stool or chair that may be available. The invariable result is a slouched posture, followed in time by rounded, sloping shoulders, a flat chest, excessively curved spine, and last by no means least, decreased lung capacity including the blood "depot".

SEVERAL years ago the writer made an estimate of the decrease in lung capacity in a thoroughly slouched position as compared with that of the erect sitting posture as being one-seventh of the total. This has been verified within the month by the subjection of 25 apparently normal persons, including members of both sexes, to a spirometer test. Readings were taken while the subject was seated in an erect posture and repeated after he had assumed a thoroughly slouched position. In each case two or more readings were taken and, in order to be perfectly fair, only that reading showing the least discrepancy has been listed. The table (opposite) records the results obtained, and shows the definite average lung capacity when slouched to be 39 cubic inches less than when seated erectly.

In the table referred to there were several who exhibited a lung capacity considerably in excess of the average, which is generally conceded to be 200 cubic inches. No. 5, with a capacity of 315 when erect and 270 when slouched is a young man muchly given to athletics. The others whose higher reading was in excess of 225 cubic inches, were men, well developed muscularly and whose occupation required muscular exertion in the open air.

The table presents a strong argument in favor of postural seating in all classes of business—whether commercial or industrial. Just any article termed "a chair" or "stool" will by no means overcome the deleterious effect of the enormous daily loss approximating 75,000 cubic inches of air during tidal respiration, estimated at 20 cubic inches for each respiratory cycle.

LUNG CAPACITY IN CUBIC INCHES

	Seated Erectly	Seated Slouched	Loss in Cubic Inches
1	255	220	35
2	195	160	35
3	230	165	65
4	225	195	30
5	315	270	45
6	240	195	45
7	210	180	30
8	225	190	35
9	200	170	30
10	195	155	40
11	230	205	25
12	195	165	30
13	215	180	35
14	235	200	35
15	190	160	30
16	210	190	20
17	205	170	35
18	235	205	30
19	195	150	45
20	195	165	30
21	200	180	20
22	195	160	35
23	245	200	45
24	200	170	30
25	195	165	30

The writer, in 1933, published an article on "Blood Pressure as Affected by Improper Posture", which contained a table showing the comparative blood pressure readings made in both the erect and the slouched postures of 100 subjects with ages varying from 21 to 68 years. In this table there was only one case in which there was no change in the reading taken in the two postures. There was one case in which a change was noted in the diastolic pressure only, and five

TABLE SHOWING 100 COMPARATIVE BLOOD-PRESSURE READINGS MADE IN ERECT AND SLOUCHED POSTURES

	Age	Erect S	Erect D	Slouched S	Slouched D		Age	Erect S	Erect D	Slouched S	Slouched D		Age	Erect S	Erect D	Slouched S	Slouched D
	21	128	68	133	70		35	145	90	154	98		46	130	80	135	83
D	22	120	68	120	72		35	130	90	137	92		46	130	85	141	88
	22	115	75	120	76		36	130	90	138	94		46	140	85	150	89
	23	130	65	138	71		36	130	95	133	98		46	150	100	156	108
	23	120	70	123	73		36	135	95	138	99		46	135	75	142	78
	23	145	85	152	88	S	36	160	100	168	100		48	138	75	140	79
	23	130	90	134	92		36	118	90	124	92		48	140	80	147	84
	24	135	75	141	77		37	120	80	131	82		48	150	85	156	88
	25	120	85	126	87		37	110	80	118	88		48	170	120	179	122
	26	115	85	122	86		37	120	85	127	87	S	49	138	80	145	80
*	26	140	75	140	75		38	140	80	146	85		49	150	85	156	89
	27	130	80	136	81		38	140	90	149	97		50	114	70	124	74
	28	125	80	131	82		38	120	70	125	74	*	50	125	75	125	75
	28	125	78	128	80		38	135	75	141	78		50	170	85	175	89
	29	180	95	190	102		39	150	100	155	107		51	120	60	125	65
	29	140	85	150	88		39	140	90	145	94		52	150	90	161	93
	29	130	95	138	96		39	136	78	140	83		53	145	90	154	92
	30	125	76	132	80		40	140	80	147	88		54	140	85	145	89
	30	110	70	118	76		40	130	85	135	91		54	150	80	159	84
	30	125	75	130	79		40	135	85	140	87		55	135	80	141	88
	30	120	70	124	72		40	140	80	145	82		56	150	90	160	99
	30	122	90	127	93		41	130	80	138	82		56	138	82	144	86
	31	135	80	139	84		42	135	85	138	89		56	160	115	170	120
	31	120	70	123	73		42	130	74	141	77		58	155	90	159	97
	32	125	70	129	73	S	43	135	70	142	70		59	130	70	133	78
S	32	150	100	155	100		43	125	75	127	77		59	160	85	170	88
	32	125	75	130	81		43	140	75	149	77		60	120	70	128	75
	32	125	65	129	66		43	165	105	173	112		64	165	100	171	106
	32	145	80	151	85		44	142	90	150	96		64	160	100	170	105
	32	120	70	127	73		45	140	90	143	96		65	185	90	188	91
	32	110	70	115	71		45	150	110	156	117		66	155	85	160	88
	33	120	72	129	79		45	145	85	151	86	S	67	150	90	160	90
	35	140	90	148	95		45	125	80	129	82		68	140	80	151	87
	35	130	80	137	84												

* Indicates no change noted in either pressure.

S Indicates change noted in systolic pressure only. D Indicates change noted in diastolic pressure only.

cases in which systolic pressure changes alone were shown. The table is repeated here as the Spirometer Test Table, above given, would seem to indicate that the change in lung capacity was responsible for the increases in blood pressure in at least some of the cases listed in the latter table.

It cannot be denied that an erect seated posture will tend to promote a more nearly full lung capacity breathing and thus minimize the tendency to increased blood pressure in all individuals. In those already exhibiting a hyperpiesis, the regular assumption of an erect posture—by increasing the lung capacity and therewith the lung capillary storage "depot" for blood—will find an appreciable reduction in blood pressure to result. Chairs constructed along anatomical lines, thoroughly adjustable to each individual occupant, will favor the assumption of an erect sitting posture and permit the continual maintenance of such a position with a minimum cost of mental effort, nerve expenditure, and muscular exertion. A magnificent boon to that vast army of workers, including executives, whose labors are performed while seated. They particularly will benefit by the increased capacity attendant upon a fuller inspiratory cycle, which will naturally follow the maintenance of an erect sitting posture.

Ergotamine Tartrate in the Treating of Post-Concussion Headache

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Recent studies of the mechanism and early treatment of cerebral concussion offer the hope of minimizing the long train of symptoms which sometimes persist after concussion. Though these symptoms are of varied character, they consist mainly of headache, dizziness, visual and auditory disturbances, and emotional instability. A detailed neurological examination occasionally reveals objective signs of organic brain injury, but more often we are entirely dependent upon subjective symptoms. Headache which usually occurs at irregular intervals and lasts for several hours is most troublesome. Most patients report that the only basis on which they can predict the advent of headache is humid weather since most headaches occur during the hours preceding rain.

Migraine (non-traumatic headache of unknown origin) is less often associated with weather conditions, but, in every other respect, it is clinically similar to post-concussion headache. Since the first report of Lennox[1,2] in 1934, several authors have confirmed the efficacy of Ergotamine Tartrate in the treatment of migraine. After observing two patients, who suffered with frequent attacks of disabling migraine, obtain dramatic relief from symptoms by the use of Ergotamine Tartrate for more than a year, I used this drug in six cases of male wage earners with post-concussion syndromes. They were disabled by reason of head injuries for periods varying from a few weeks to eight months after injury. The injury in all cases was head trauma, followed by a short or long period of unconsciousness. With one exception, all of the patients had returned to work at their usual salary before Ergotamine Tartrate treatment was begun. Two of these cases follow:

L. S., truck driver, age 46. On January 4, 1934, he fell off a truck to the pavement. He was unconscious for about 15 minutes and was taken by ambulance to the hospital where he remained for three weeks. X-ray did not show any evidence of skull fracture. Subsequent to discharge, he complained of almost daily occipital headaches, attacks of dizziness and a feeling of depression.

Thirty-one weeks later, he returned to work and was not assigned to any job which required him to be on top of moving trucks. Since his return, he has worked without loss of time, but he states that his occipital headaches continue with an attack almost every day. For no known reason, he has periods of two to three days when he is entirely free of headache. He does not sleep well; he falls asleep as usual, but in two or three hours wakes up and then cannot sleep again. There is no discomfort when he wakes, only restlessness and inability to fall asleep again. On June 16, 1936, the course of treatment with Ergotamine Tartrate solution 1/2000 was begun: The first hypodermic injection of .6 cc., three injections of .8 cc., then 13 injections of 1 cc. given approximately twice a week when he had headaches. After the first injection he complained of nervousness and nausea for several hours but subsequently had no untoward reaction. He derived no benefit from the treatment and reported that his headaches and insomnia continued. At the end of three months, the treatment was discontinued.

In two cases, we combined the injection with medication.

S. R., laborer, age 34. He was struck on the back of the head by a swinging door of a motor truck and rendered unconscious for about 10 minutes. He then was sent home in a taxicab. He was disabled from his work for four months because of headaches, insommia, and dizziness on walking on stairs and on elevations

Five months after injury, he still complained of headaches. He was given an injection of ¾ cc. Ergotamine Tartrate solution. Six days later he returned stating that he had chilly sensations after the injection, but no other effect. He was given tablets of Ergotamine Tartrate, each containing 0.001 gm. to take by mouth, if he had a headache, on Monday, Wednesday and Friday, two every 20 minutes until he had taken six tablets. On the other days, if he had any headache, he was given an injection of Ergotamine Tartrate solution, ¾ cc. The first three weeks, he reported some improvement, but during the next two weeks the symptoms were the same as before treatment had been instituted. No medication was given for the following two weeks and then the same course of treatment was administered for a period of five weeks. After three months, treatment was discontinued entirely as being ineffective.

Lennox, Von Storch and Solomon[3] have reported the failure of Ergotamine in 85% of the cases of headaches due to increased intra-cranial pressure, to septic meningitis or to post-convulsive states and other conditions not included in migraine. The experience here reported indicates that the post-concussion headache should be added to the list of headaches in which Ergotamine Tar-

trate is not useful. Since the therapeutic effect is different, we can safely state that the pathology of migraine and the pathology of the post-concussion headache are different. They resemble one another only in this respect, the mechanism of their production is unknown.

SUMMARY: Ergotamine Tartrate was administered to six patients with post-concussion headaches. There was no improvement which could reasonably be ascribed to the Ergotamine Tartrate. The use of this drug in cases of post-concussion syndrome is without effect.

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The Collateral Circulation in the Hand

—*After Cutting the Radial and Ulnar Arteries at the Wrist*—

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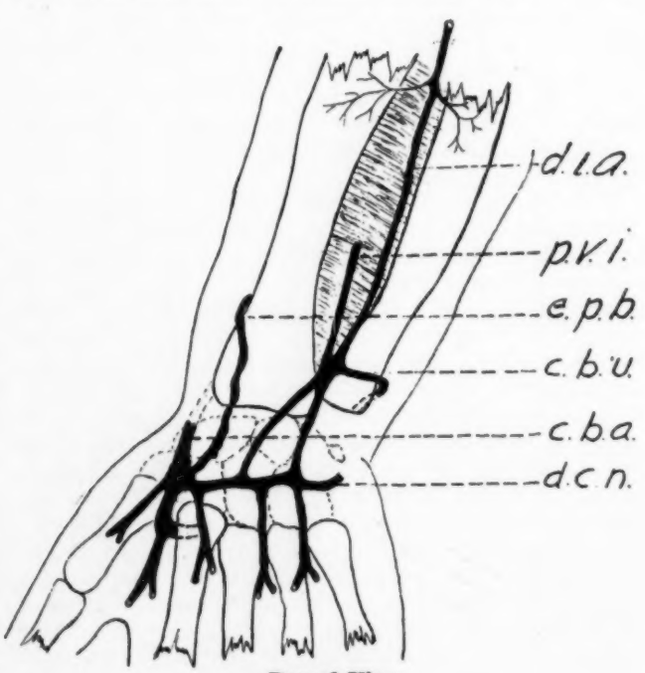
THE question often arises, especially in traumatic surgery, as to the relative degree of efficiency attained by the collateral circulation in the hand after complete separation of the radial and ulnar arteries at the wrist.

The wrist and hand of a cadaver dissected by the writer at the University of Wisconsin yielded very interesting and instructive material on this question. A transverse laceration on the palmar aspect of the wrist, undoubtedly incurred many years before the death of the individual, had completely separated the radial and ulnar arteries, median and ulnar nerves and superficial flexor tendons. The usual changes occurring after nerve section were all found present, namely: degeneration of muscle, clawing of fingers and presence of the typical "ape hand". The most significant thing was the completely established collateral circulation, which had apparently served the hand with an adequate blood supply. As shown in the accompanying sketches the cut ends of both arteries were entirely separated from each other. The volar interosseous artery was enlarged to about four times its usual size, this artery carrying most of the blood to the wrist and hand. The terminal branches of the volar interosseous artery were also markedly enlarged and very tortuous. The volar carpal artery supplied mainly the distal segment of the cut radial artery.

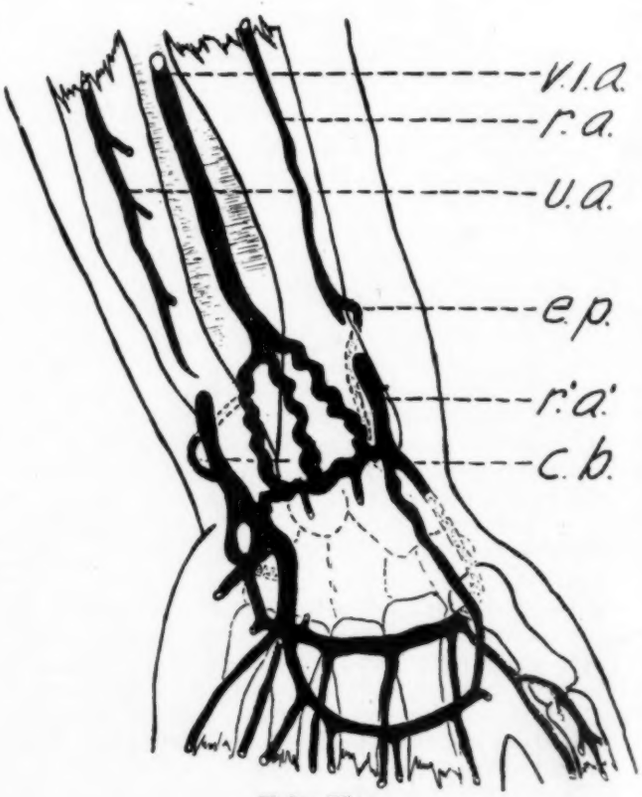
The perforating branch of the volar interosseous artery was considerably larger than usual, and after joining the dorsal interosseous artery divided into two large branches which ended in the dorsal carpal network. The dorsal interosseous artery also sent a communicating branch to the distal segment of the ulnar artery as shown below.

All of the blood to the hand first passes through either the dorsal or volar carpal network. The



Dorsal View

d.i.a. Dorsal interosseous artery
p.v.i. Perforating branch of the volar interosseous
e.p.b. Enlarged periosteal branch to the dorsal carpal network
c.b.u. Communicating branch to the distal segment of the ulnar artery
c.b.a. Communicating branch to the distal segment of the radial artery
d.c.n. Dorsal carpal network



Volar View

v.i.a. Volar interosseous artery
r.a. Radial artery
u.a. Ulnar artery
e.p. Enlarged periosteal branch to the dorsal carpal network
r'a' Radial artery—distal segment
c.b. Communicating branch to dorsal network

volar carpal network received blood from the volar interosseous. The dorsal carpal network may receive its blood from three different sources. There is a branch from the radial artery proximal to the cut, which curves around to the posterior surface of the radius and descends along the back of the styloid to the dorsal carpal network. This branch is not usually seen and described in the normal wrist and is very likely an enlarged periosteal artery. The perforating branch of the volar interosseous artery and the dorsal interosseous artery comprise the remaining two sources of supply to the dorsal carpal rete.

It will be recalled from our study of anatomy that there is at all times a rather free anastomosis between the volar and dorsal interosseous arteries, and also between the volar interosseous and the volar carpal arch. A cut at the wrist would rarely include these vessels for they are very deeply placed. Treves reported the interesting case of a man who had cut the radial artery in three places and all but the proximal end of the middle section was ligated. After the patient was put to bed he very nearly bled to death from that unlighted end. This seems further to demonstrate the free anastomosis encountered in this region.

The above would seem to indicate that severing the ulnar and radial artery at the wrist is not an indication for immediate amputation.

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Bronchogenic Carcinoma

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THE current programs of extensive health surveys in community and industrial groups afford an intriguing prospect in the study of the distribution of subclinical as well as clinical disease in the general population.* Heretofore, only dispensary and hospital patients have furnished the samples upon which analyses of the non-contagious diseases could be made. A considerable responsibility rests upon the personnel in charge of these surveys, not only in the selection of methods and means, but also in the careful interpretation of the findings. This is particularly true at the present time of the physicians examining the industrial groups.

The roentgenogram affords a facile means for rapid and detailed survey of the pulmonary and cardiovascular status of large groups, with the added value of a graphic record for future reference. But the multiplicity of the changes which may be encountered within the thorax will require close attention, and rather wide experience upon the part of the consulting radiologist.

For these reasons it is pertinent to consider bronchogenic carcinoma, an imitator of several less serious pulmonary diseases.

The recent literature presents a considerable discussion as to whether or not this neoplasm is actually increasing in frequency. Of late, the consensus would seem to be that it is not. But the progress made in scientific methods of examination, particularly with the development of roentgenology, bronchoscopy and thoracic surgery, has permitted more accurate diagnosis. This is reflected in the biopsy and autopsy statistics. Weller in 1929 reported 0.47% of 3000 autopsies to be bronchogenic carcinoma, while Samson in 1935 added 1500 autopsies from the same clinic (University Hospital) with a frequency of 1.33%. At the present time approximately 4% of all malignancies examined histologically at the University Hospital are bronchogenic carcinoma.

For purposes of illustration we have analyzed the 62 cases in which the final diagnosis of bronchogenic carcinoma was made in the University Hospital during the period from July 1, 1934, to December 31, 1936. These represented but 0.11% of all patients registered during the period.

Occupation seems to have little importance. There has been some discussion as to the extensive use of tar for road surfaces, exposure to automobile exhaust gases, dusty trades, tobacco smoke, etc. In a series reported from the New York City Cancer Institute in 1936 housewives were affected as often as laborers. In our series farmers were affected most frequently, housewives next most commonly. The occupational significance as shown by the following table is virtually nil, conforming rather to the industrial and agricultural character of the population of the State.

TABLE I—OCCUPATIONS

INDUSTRIAL PERSONNEL — 23			
Foundry laborers	5	Mason	1
Moulder	1	Carpenter	1
Miners (iron)	2	Baker	1
Laborers unclassified	4	Brewmaster	1
Blacksmith	1	Buttermaker	1
Stationary fireman	1	Printer	1
Toolmaker	1	Truckdriver	1
Machine operator	1		
FARMERS	10	HOUSEWIVES	9
MERCHANDISING AND CLERICAL — 9		PROFESSIONAL — 7	
Salesman	3	Lawyer	1
Auditor	1	Teacher	1
County clerk	1	Civil engineer	1
Drug clerk	1	Student	2
Cook	1	Barber	2
Waitress	1		
Tailor	1	None	4

Sex dominance was male in a ratio of slightly more than 5:1 (52 males, 10 females).

Age distribution is shown in Table II. The youngest was a male student of 18 years, the eldest a woman of 78 years.

TABLE II—AGE INCIDENCE

Males		Females
1	20 years or less	0
1	21 - 30 years	1
12	31 - 40 years	1
11	41 - 50 years	3
22	51 - 60 years	2
5	over 60 years	3
52		10

The relative frequency among the males in the age-groups from 31 to 60 years would seem to be of some significance to the industrial physician.

*Read before the American Association of Industrial Physicians and Surgeons, Detroit, Michigan, May 7, 1937.

Clinical Manifestations

HICKEY aptly said: "The clinical symptoms of a lung carcinoma may occasionally be unimportant from the patient's standpoint, so that the clinical investigation may not be centered upon the thorax".

The *onset* of the disease, as manifest in symptoms, is predominantly insidious. Weakness on one side progressing to hemiparesis, anorexia, ease of fatigue, suboccipital mass, considered a "wen" but not healing after excision, were among the initial complaints. One patient was operated upon for supposed brain tumor with the resultant discovery of a metastatic carcinoma, another had neurofibromatosis of the skin, two had laminectomy for the relief of spinal block. But 19 of the 62 were aware of an acute episode at the onset of the symptoms.

Pain among the initial symptoms commonly was diffuse over the lower chest and epigastrium, or located by the patient in the shoulder or back. Only two complained of a pleuritic type of pain.

By the time these patients were admitted cough, sputum, dyspnoea, and streaking or hemoptysis were high in order of frequency, leading the ultimate observer to include a careful study of the thorax in his search for cause of the patient's complaints.

TABLE III

Initial	Symptoms	Aggregate on admission
22	Cough	51
12	Pain, other than pleuritic	41
2	Pain, pleuritic	2
3	Sputum	38
1	Loss of weight	38
7	Weakness, or ease of fatigue	37
5	Dyspnoea	35
2	Streaking or hemoptysis	25
2	Gastro-intestinal complaints	17
2	Neurological complaints	12
1	Cervical adenopathy	2
0	Hoarseness	7
1	Tumors of scalp	2
1	Headache	2

The *sputum* as described by the patient was commonly mucoid, (whitish or frothy), rarely purulent, usually not apparent at first. Five patients had had a cough for many years. Three of these had observed a recent increase in severity. Seventeen stated that they had a more or less persistent cough since a previous acute respiratory infection.

The physical signs have not been included in this analysis because of the fact that, although of great importance, they undergo marked change with the progress of the disease, as discussed by Weller in his study of the pathology of the signs and symptoms of primary carcinoma.

Among the 33 in which we have autopsy, or unmistakable bronchoscopic biopsy knowledge of the location of the *primary lesion* there is little evidence of correlation in pattern between location and cell type. In our hospital these neoplasms are classified, on the basis of the degree of entdifferentiation which has taken place, into three main groups, squamous-cell carcinoma, adenocarcinoma, and undifferentiated-cell carcinoma of bronchogenic origin.

Roentgenologic Evidence

THE roentgenographic pattern will be determined by the dominance or combination of one or more general types of involvement; namely, infiltration, nodule or tumor formation, atelectasis by bronchostenosis, pleural involvement, metastasis to regional or distant structures, the presence or absence of paralysis of the diaphragm, or necrosis within the neoplastic area.

Further. much will depend upon the point of origin of the neoplasm along the respiratory passages, and whether or not infiltration occurs before stenosis. The frequent intervention of secondary infection in the parenchyma of the lung peripheral to such lesions is well known, and may alter the appearance by suppurative processes. This further may considerably modify the roentgenologist's opinion because of the associated clinical signs of fever or leucocytosis.

There has been some effort in the literature to correlate cell-type with the roentgen manifestations. The nature of the squamous-cell carcinoma would seem to predicate earlier stenosis, hence atelectasis, than the others. The adenocarcinomas should afford more prominent tumefaction and metastases, and the undifferentiated-cell-type varieties of either. In the 42 cases of this series which were histologically classified there is little suggestion of roentgenographic pattern as shown in Table IV.

There are a number of patients with bronchogenic carcinoma who present a roentgenographic pattern in the lung fields which logically cannot be classified under other disease entities directly, or when considered in correlation with the clinical symptoms and signs.

However, we have referred above to the fact that bronchogenic carcinoma not infrequently is an imitator of other less serious lesions. As illustrations of its protean character, we present cases which roentgenographically may readily be confused with unresolved pneumonia, atelectasis following tooth extraction, pulmonary abscess, empyema, tuberculosis, lymphoblastoma and von

TABLE IV — ROENTGENOGRAPHIC EVIDENCE ON ADMISSION, HISTOGICALLY CLASSIFIED CASES

No. of Cases	Cell Type	Infiltration	Tumor or Nodule	Atelectasis	Pleural Involvement	Metastases to contralateral lung or distant structures	Palsy of Diaphragm
18	Squamous-cell carcinoma	12	4	3	5	2	0
11	Adenocarcinoma	9	6	1	3	3	2
13	Undifferentiated-cell carcinoma	6	7	4	6	2	3
42	Total-Histologically classified	27	17	8	14	7	5
62	All Cases	40	21	14	20	12	6

Recklinghausen's disease, together with one presenting primarily tumors of the scalp, another with hemiparesis, and a third supposedly carcinoma of the diaphragm, all three without symptoms referable to the lungs.

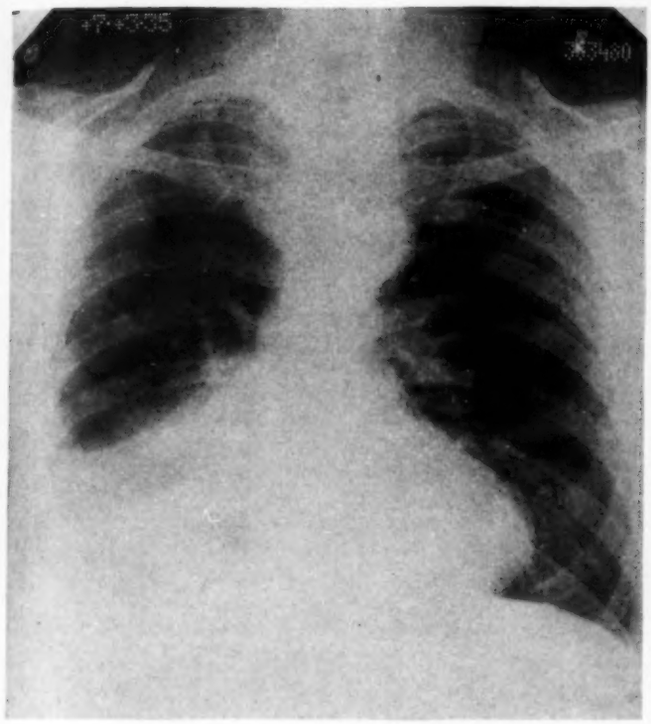
Unresolved Pneumonia: Case 1. Farmer, 56. History of "flu" in November, 1934, with persistent dull ache in right scapula, a "cold" in December, with onset of pleuritic pain, chills, fever, and productive cough with streaking in March, 1935. Had improved following two weeks in bed, but fatigue, weakness and increased dyspnea on exertion continued.

Clinical diagnosis on admission, July 2, 1935, was pleurisy with effusion, right pulmonary tuberculosis.

bronchus. Metastases to regional nodes in right and left hilum, tracheobronchial nodes, pericardium, and heart.

Atelectasis: Case 2. Barber, aged 50 years. History of a cold six months previous to admission, with jaundice, night sweats, weight loss and recurrent hiccough two months later, some blurring of vision and headache. The jaundice improved following the extraction of all his teeth two months before admission. Two weeks before admission his hiccough had returned with slight back pain.

Roentgenogram on admission March 11, 1935, presented a characteristic appearance of a consolidation and partial atelectasis of the right superior lobe.



CASE 1

Fig. 1. July 3, 1935. Pleuritis and pneumonitic right base. Questionable mass at root of lung

Fig. 2. Potter-Bucky diaphragm study demonstrating the tumor suspected. Confirmation by bronchogram and bronchoscopy with biopsy

Final diagnosis: CORNIFYING SQUAMOUS-CELL CARCINOMA of the right inferior bronchus

Roentgenogram, July 3, 1935: Obliterative pleuritis with underlying parenchymatous and peritruncal infiltration.

Depression of the accessory fissure.

The appearance was compatible with an unresolved pneumonia with pleuritis and partial atelectasis, save that there was some suggestion of a nodular mass to the right of the heart shadow. Consequently Potter-Bucky studies were made with the definite demonstration of a tumor mass at the root of the lung, inferiorly.

Bronchograms demonstrated a constriction and distortion of the dorsal descending ramus of the right inferior bronchus. Bronchoscopy confirmed the location and afforded biopsy material.

Right pneumonectomy was successfully accomplished but the patient died four weeks later due to sudden intrathoracic hemorrhage from the stump of the right pulmonary artery.

Final diagnosis: (autopsy) *Cornifying squamous cell carcinoma arising in the right inferior*

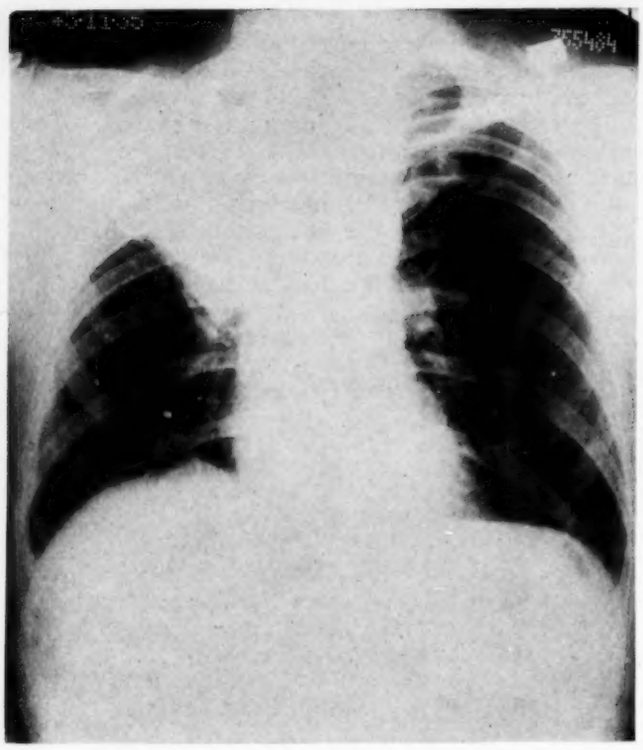
Bronchoscopy revealed a tumor mass reducing the lumen of the right stem bronchus by 75%.

Supraclavicular lymphnode biopsy revealed a *metastatic malignant neoplasm, probably undifferentiated carcinoma.* The patient subsequently died at home.

Without the history in this case one might easily confuse the x-ray appearance with a post-aspiration lesion.

Lung Abscess: Case 3. Farmer, aged 47 years. This patient presented a fairly characteristic history of left lobar pneumonia with pleurisy five months before admission, subsequent productive cough and pleuritic pain of increasing severity. On admission August 13, 1935, he was moderately dyspneic and slightly cyanotic. Fever 100-101°F.; 150 gm. sputum daily, negative for acid fast or fuso-spirochetal organisms.

Roentgenogram on admission revealed a large excavation in the upper left. This did not improve with temporary phrenic paralysis.



CASE 2

Fig. 3 March 11, 1935. Consolidation with partial atelectasis of the right superior lobe. Supraclavicular lymphnode biopsy: METASTATIC MALIGNANT NEOPLASM, PROBABLY UNDIFFERENTIATED CARCINOMA

Surgical drainage of the excavated area was accomplished on October 2, and afforded biopsy material.

The patient suddenly developed stupor with left hemiparesis one month later, and died. Autopsy revealed extensive metastases including the brain and meninges.

Final diagnosis: (Autopsy) *Anaplastic medullary squamous cell carcinoma arising in the left superior bronchus.* Direct extension into left superior lobe of lung, mediastinum, epicardium and myocardium. Neoplastic thrombus left innominate vein. Metastases to bronchial, peritracheal and peri-aortic nodes, brain, meninges, both lungs, and right kidney. Necrotic excavation of carcinoma in left lung.

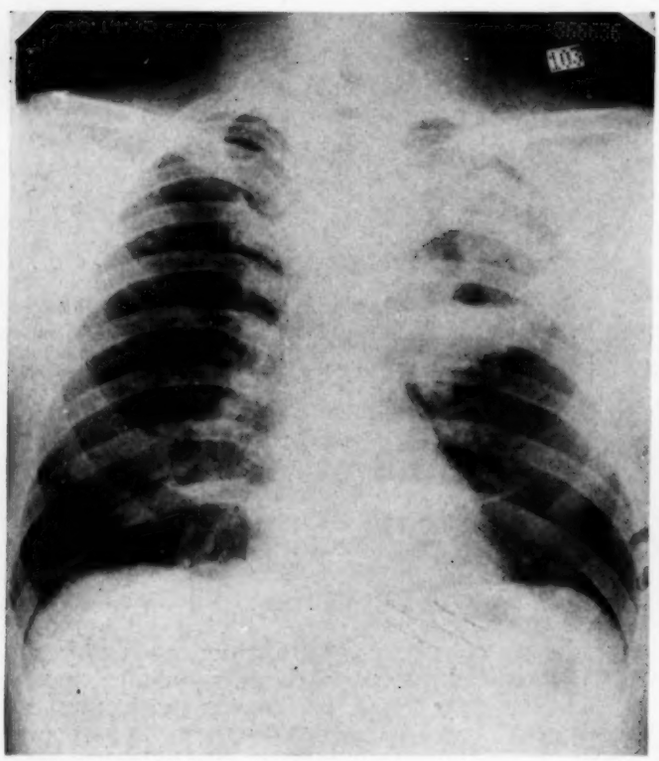
The character of the wall of the excavated area as shown on the roentgenogram is not so suggestive of neoplasm as in the following case.

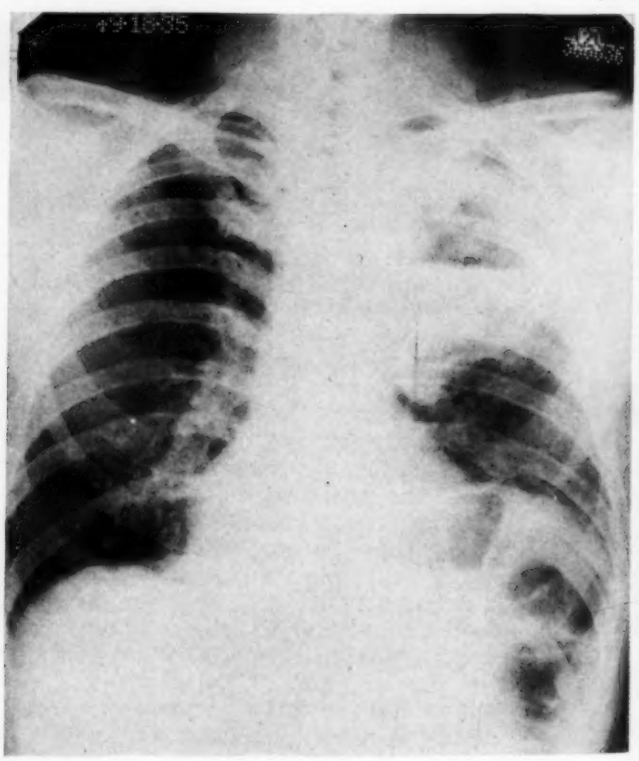
CASE 4. Cook, aged 55 years.

History of ease of fatigue, weakness, cough with whitish sputum beginning 15 months before admission. Three months after onset had had an episode of chills, fever and streaked sputum. At that time he was told he had tuberculosis, and went to Colorado. Did not improve, the sputum becoming foul five months later. He attributed his early cough to the irritation from kitchen air. On admission he was dyspneic.

Roentgenogram on admission May 16, 1936, revealed a gross excavation in the left lung with a sharply circumscribed, thick wall having nodular protrusions on its inner surface.

Bronchogram demonstrated the abnormality of the superior lobe bronchi.



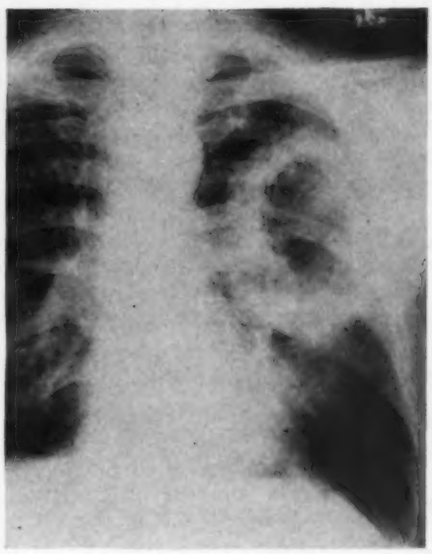


CASE 3

Fig. 4. August 14, 1935. Gross excavation in left upper lung. Some suggestion of a nodular character of the cavity wall

Fig. 5. September 18, 1935. No improvement following temporary left phrenic nerve interruption. definitely nodular wall of excavation

Final diagnosis: ANAPLASTIC MEDULLARY SQUAMOUS-CELL CARCINOMA of the left superior bronchus. Necrotic excavation of the carcinomatous pulmonary infiltration



CASE 4

Fig. 6. May 13, 1936. Gross excavation in left mid-lung with partial involvement of the lingula. Thick, definitely nodular wall

Fig. 7. May 19, 1936. Bronchographic detail showing distortion and stenosis of bronchi in areas of involvement.

Fig. 8. October 7, 1936. Progression of the lesion with markedly NODULAR interior of the cavity wall

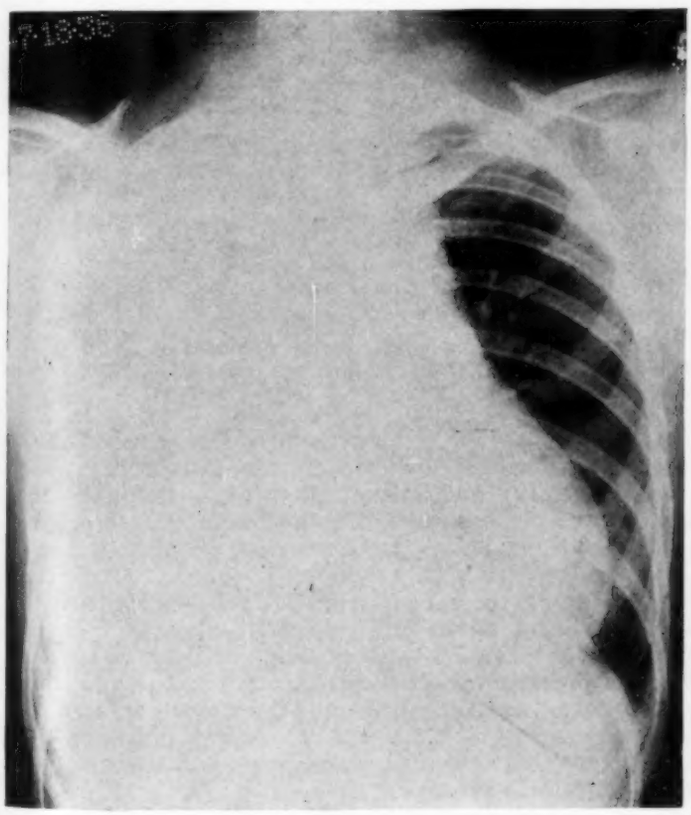
Surgical biopsy: WELL-DIFFERENTIATED BRONCHOGENIC SQUAMOUS-CELL CARCINOMA

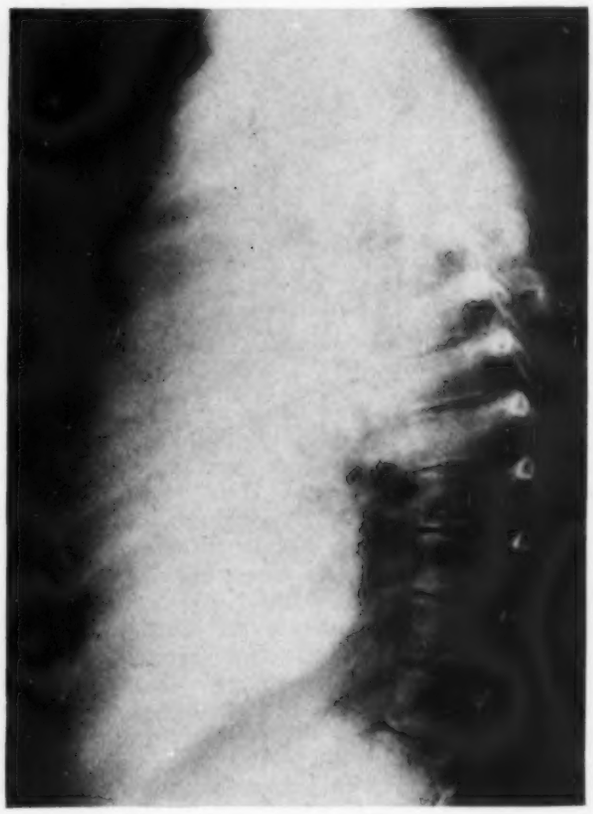
The lesion progressed in size and degree of nodular character of wall.

Surgical drainage of the excavation afforded *biopsy* material, which was classified as a *well-differentiated squamous-cell carcinoma.*

The irregular or nodular interior of the wall of the excavation should afford some suggestion of a neoplastic lesion rather than simple abscess.

PLEURISY WITH EFFUSION OR EMPYEMA: Case 5. Waitress, aged 20 years.





CASE 5

Fig. 9. July 18, 1936. Obscuration of the right lung field with displacement of the mediastinum toward the contralateral lung

Fig. 10. Lateral view demonstrating an apparent encapsulation of fluid accumulation, but actually due largely to the tumor

Final diagnosis: UNDIFFERENTIATED BRONCHOGENIC CARCINOMA of right lung

This young woman complained of a sudden onset of cough and fatigue four months before admission. She thought her symptoms were due to her work at night with poor opportunity to sleep during the day. Two months later a severe pain across the lower chest appeared. She had lost 20 pounds weight. Her father had died of tuberculosis when she was three years old.

The clinical diagnosis on admission was empyema. (WBC 29,000 per cmm.)

Roentgenogram on admission July 18, 1936, presented a gross obscuration of the right hemithorax with some displacement of the heart and mediastinum to the left. The lateral view suggested either gross encapsulated fluid or tumor.

Her course in the hospital was rapidly down hill. Twenty cc. of bloody fluid were aspirated from the chest. Death occurred in one week.

Final diagnosis: (Autopsy) *Undifferentiated bronchogenic carcinoma right lung.* Massive carcinomatous infiltration right lung, pleura, and mediastinum. Metastases to tracheobronchial, mediastinal, cervical and abdominal nodes, vertebral and sternal bone marrow.

This case demonstrates in some degree the error which a leucocytosis might induce in the interpretation of obscuration of the lung with mediastinal shift, part of which was due to the neoplastic involvement.

PNEUMONITIS: Case 6. Foundry laborer, aged 50.

Complained of cough since he began work in a foundry two years before. Loss of weight, some dyspnea on exertion for one year prior to admission. Was told his right lung was filled up with sand, no tuberculosis at that time. Stopped work eight months before admission on the advice of his home physician, when a sharp pain in the chest began. Streaking and hemoptysis for the past six months.

The clinical diagnosis on admission was pneumoconiosis, with a question of tuberculosis or neoplasm.

Roentgenologic examination of the chest (June 7, 1935) did not reveal any evidence of appreciable pneumoconiosis. There were some signs of emphysema. The major abnormality was a patchy peritruncal infiltration in the left inferior lobe suggesting an exacerbation of a chronic bronchiectasis or suppurative pneumonitis.

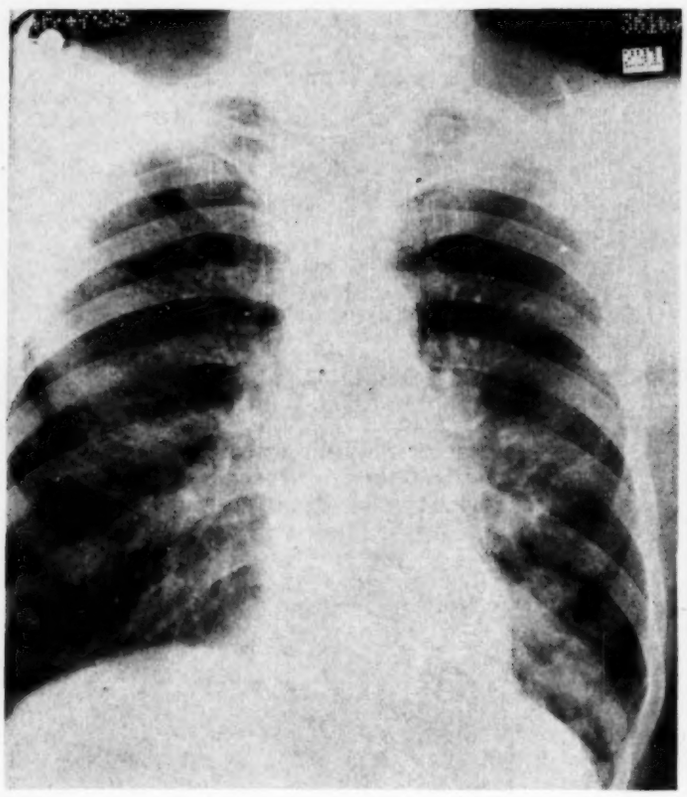
Bronchograms demonstrated an obstruction of the left inferior bronchus.

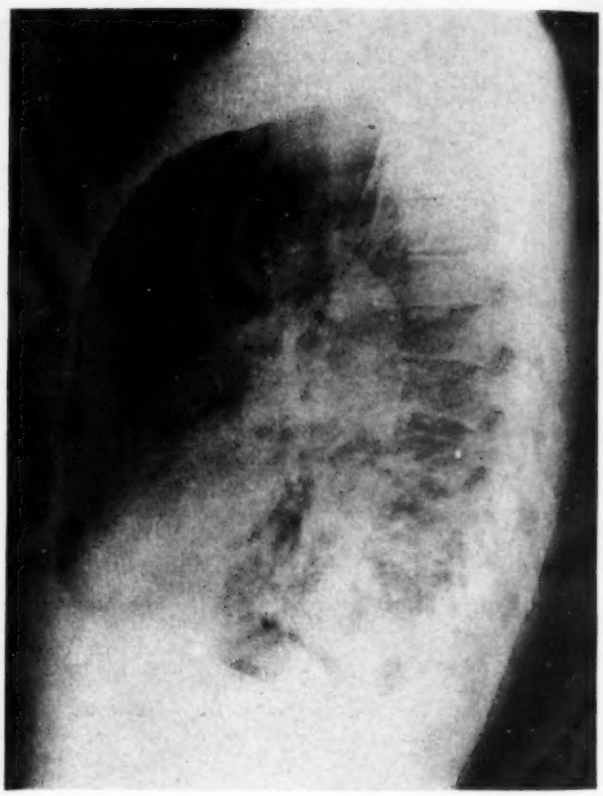
Bronchoscopy revealed a proliferative ulcerating lesion of the bronchial wall. Biopsy specimen was classified as *advanced medullary squamous-cell carcinoma with cornification and ulceration.*

The possibility of a pneumoconiosis in this case is remote. But the probability of a primary bronchogenic carcinoma could not be anticipated from the roentgen appearance.

TUBURCULOSIS: Case 7. Male teacher, aged 50 years.

Seven weeks before admission the patient had noted a chilliness, followed by a non-productive paroxysmal cough, general aching, afternoon fatigue, night sweats, weight loss and some hoarseness.





CASE 6

Fig. 11. June 7, 1935. Peritruncal infiltration left inferior lung field, suggestive of an exacerbation of a chronic bronchiectasis with pneumonitis

Fig. 12. Localization of the area of involvement to the inferior lobe demonstrated in the lateral view

Bronchographic and bronchoscopic evidence of neoplasm with positive biopsy: ADVANCED MEDULLARY SQUAMOUS-CELL CARCINOMA of the left inferior bronchus with cornification and ulceration

The clinical diagnosis on admission, October 22, 1936, was "moderately advanced pulmonary tuberculosis," which apparently was confirmed by the roentgenogram. This showed bilateral apical parenchymal lesions interpreted as old tuberculosis, with an infiltration at the root of the superior lobe extending along the accessory fissure.

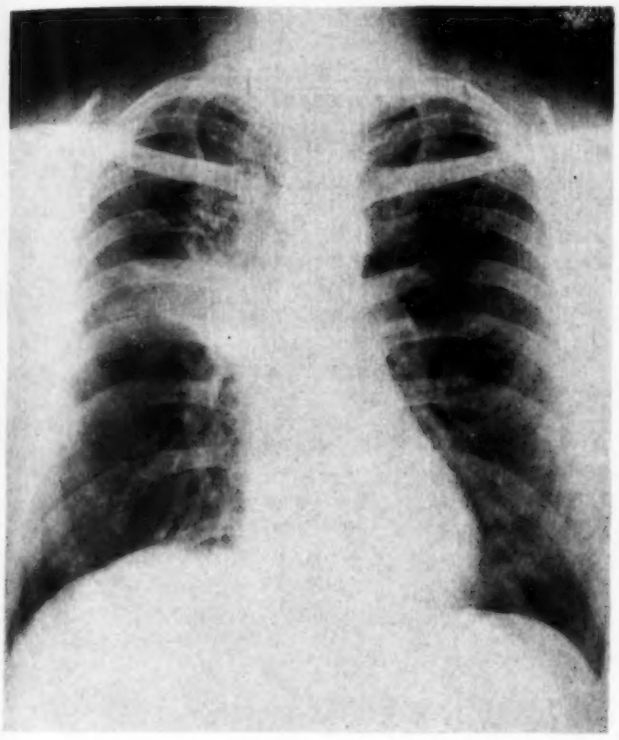
Bronchoscopy revealed bleeding from the eparterial bronchus, and a bronchogram three weeks later showed an advancing sharply demarcated infiltration within which the bronchi were distorted and obstructed.

Spine films of February 27 demonstrated compression of the 5th thoracic body and suggested abnormality in the left upper lung.

At the suggestion of the roentgen department chest films were made before the operation the following day. These demonstrated a parenchymal infiltration in the left apex with calcareous parenchymal and peribronchial scars.

Laminectomy of the 5th and 6th thoracic vertebrae was accomplished on February 28, 1935, with the partial excision of an extra-dural tumor.

The microscopic diagnosis of this tumor was



CASE 7

Fig. 13. October 22, 1936. Bilateral apical parenchymal lesions with pertruncal and subpleural involvement at the root of the right superior lobe. X-ray diagnosis of tuberculosis

Fig. 14. November 12, 1936. Progressive infiltration of right superior lobe. Some evidence of early atelectasis indicated by increased arc of the accessory interlobar fissure. DIAGNOSIS CHANGED TO PRIMARY NEOPLASM

Fig. 15. November 12, 1936. Bronchographic detail demonstrating the distortion and apparent block of the apical bronchial rami. Probable enlarged lymph node distorting the right stem bronchus proximal to the origin of the eparterial bronchus

Final diagnosis: PRIMARY CORNIFYING SQUAMOUS-CELL CARCINOMA right superior lobe. Supposed apical tuberculous lesions were focal areas of consolidation without tuberculosis

Right total pneumonectomy was accomplished, but the patient died two days postoperative.

Final diagnosis: (surgical specimen) *Primary cornifying squamous-cell carcinoma right superior lobe.* Large metastases to bronchial nodes, none in hilar nodes. The supposed apical lesions of tuberculosis were focal areas of consolidation.

CASE 8. Factory laborer, aged 39 years.

For two years this man had had a rheumatic pain between the shoulder blades finally becoming disabling four months before admission. Chiropractic treatments at that time did not relieve his symptoms. About two months before admission there was a sudden onset of weakness and numbness of the legs progressing up to the nipple level, with complete paralysis of both legs for the last few weeks.

He was admitted to the neurosurgical service.

adenocarcinoma infiltrating connective tissue and bone.

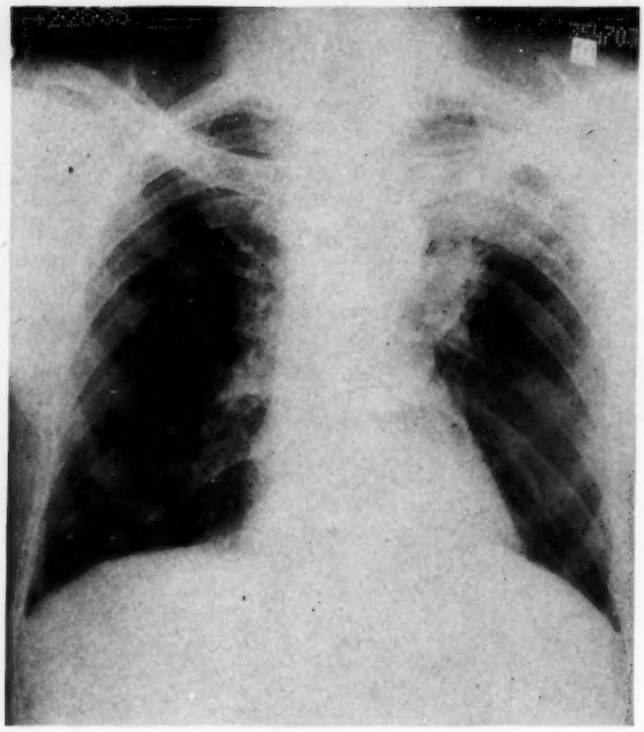
The chest appearance in this case could readily have been considered due to a reinfection of an old tuberculosis, the vertebral changes then attributable to vertebral involvement by tuberculosis. The patient complained of no symptoms referable to the chest at the time of admission.

LYMPHOBLASTOMA: Case 9. Salesman, aged 40 years.

History of "flu" five months before admission, with slight cough and malaise lasting two weeks. Subsequently some recurrence of cough with onset of severe pain in the left lower axilla and left shoulder. Dyspnea and weight loss noted one month before admission.

He was told he had an aneurysm.

Upon admission May 15, 1936, there was no ade-



CASE 8

NO SYMPTOMS REFERABLE TO LUNGS

Fig. 16. February 28, 1935. Chest examination made on the suggestion of x-ray department following observation of pulmonary abnormality on spine films. Peritruncal and parenchymal infiltration left upper with calcareous parenchymal and peribronchial scars. Laminectomy for relief of spinal block. Extra-dural tumor infiltrating surrounding bone. Histologic diagnosis: ADENOCARCINOMA infiltrating connective tissue and bone

nopathy, the serology was negative, blood pressure equal on the two sides.

Roentgenogram demonstrated a gross paramediastinal mass left with some paresis of the left diaphragm. Bronchogram revealed a distortion and partial block of the left bronchi.

Under intensive irradiation the mass rapidly diminished, the patient improved clinically. Recurrence ensued in five months to again respond to irradiation temporarily. Death occurred two months later.

The final clinical diagnosis was bronchogenic carcinoma, probably undifferentiated-cell.

The broncial involvement is not characteristic of lymphoblastoma, nor the unilateral character of so gross a tumefaction. Further in our experience this response to irradiation is a character of the undifferentiated-cell bronchogenic carcinoma.

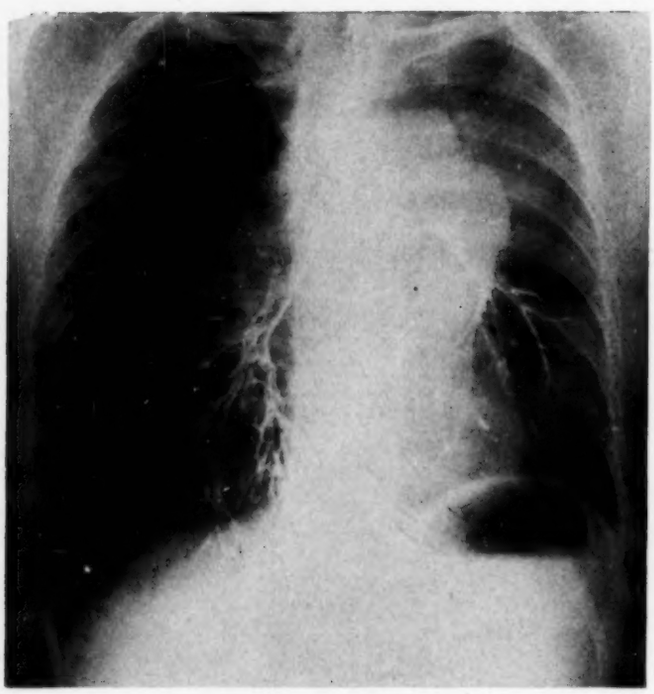
CASE 10. Graduate student, male, aged 29 years.

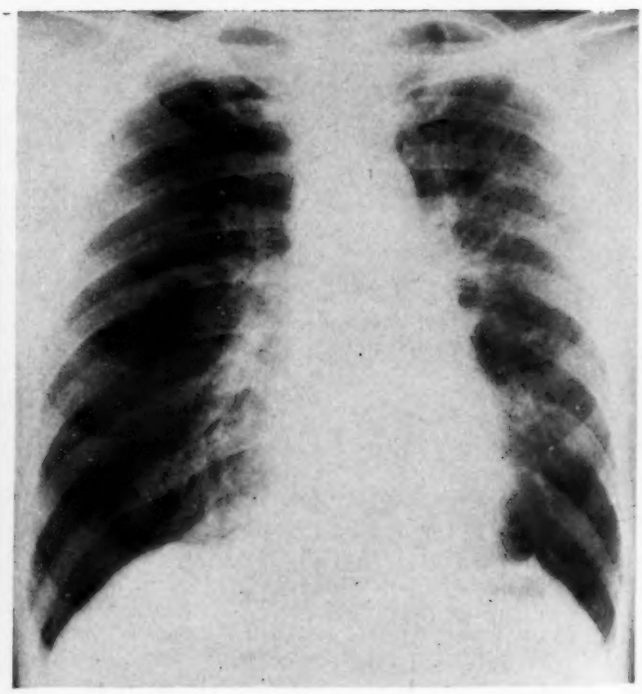
The patient complained of an insidious onset of non-productive cough during the preceding six weeks with ease of fatigue, dyspnea on exertion, substernal discomfort, anorexia, and weight loss. The sputum contained no acid-fast bacilli. The Kahn reaction was 4 plus.

The admission roentgenogram (August 11, 1934) revealed an infiltration extending outward from the root of the left superior lobe with small irregular soft parenchymal lesions scattered through the periphery of the left and right lung fields. A disseminate lymphoblastoma was considered.

The patient became progressively worse on antiluetic therapy and following roentgen irradiation. Death occurred in the fourth month.

Final diagnosis: (autopsy) *Mucin-producing adenocarcinoma probably primary in the left upper bronchus.* Direct extension to lungs, pleura and mediastinum. Metastases to lungs, hilar nodes,



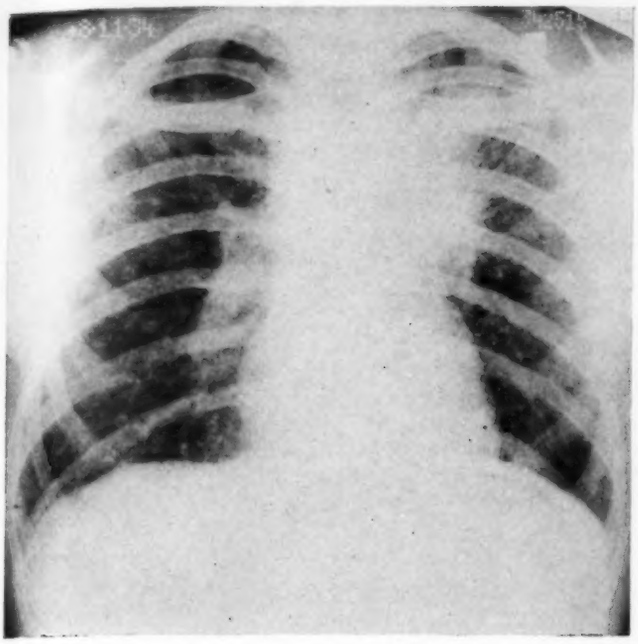


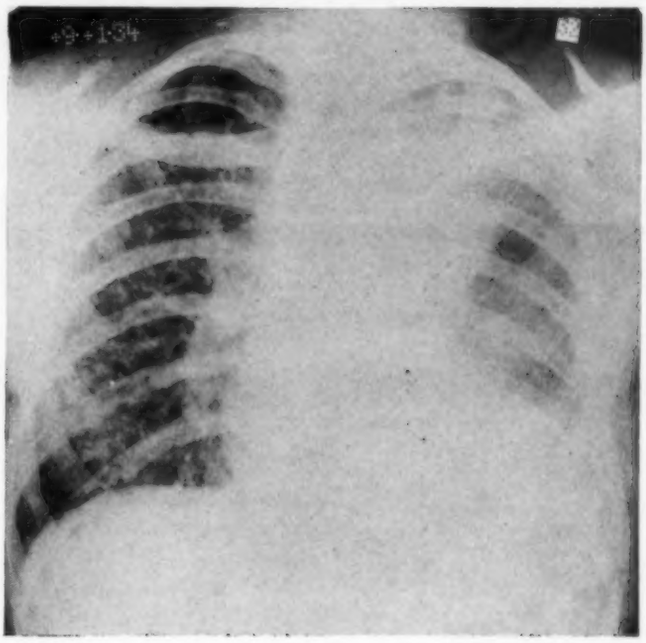
CASE 9

Mid-thoracic tumor reported by patient as having been called "aneurysm" elsewhere. Fig. 17. May 16, 1936. Lymphoblastoma strongly suggested prior to bronchogram. Evidence of distortion and partial stenosis of left superior bronchus. Paresis of left diaphragm

Fig. 18. July 15, 1936. Excellent initial response to intensive x-ray therapy, characteristic of UNDIFFERENTIATED BRONCHOGENIC CARCINOMA

Death six months later. No histologic diagnosis



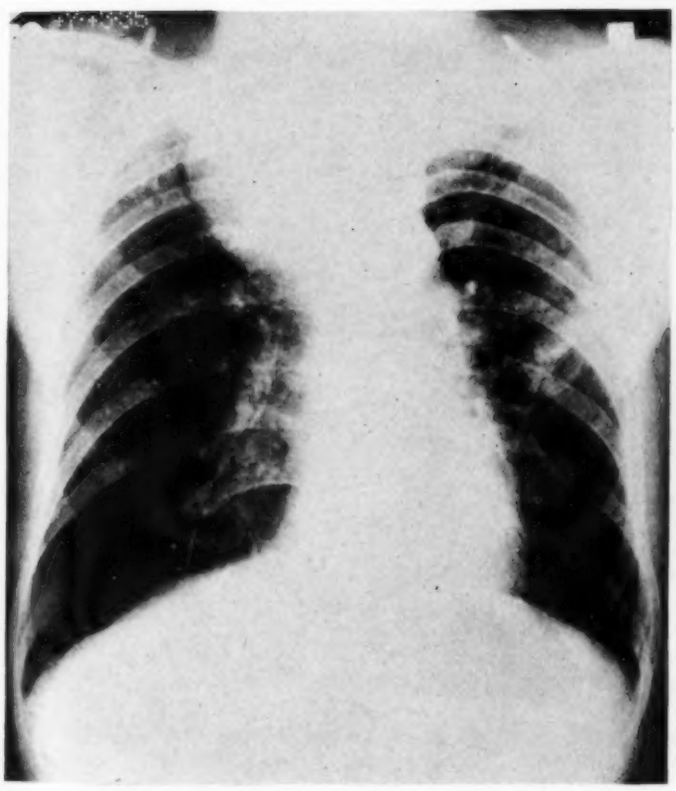


CASE 10

Fig. 19. August 11, 1934. Bilaterial peritruncal and parenchymatous infiltration with greater involvement left paramediastinal lung. Provisional diagnosis: lymphoblastoma.

Fig. 20. September 1, 1934. No response to irridiation clinically. Progressive disease shown by films. Death four months later

Final fiagnosis: MUCIN-PRODUCING ADENOCARCINOMA, probably primary in left upper bronchus



CASE 11

CUTANEOUS NEUROFIBROMATOSIS

Fig. 21. July 3, 1935. Gross tumor right posterior thoracic apex displacing trachea and esophagus. Parenchymatous infiltrations bilaterally, tuberculosis or local aspiration pneumonitis considered. Clinical diagnosis: Mediastinal tumor, probably neuro-fibroma

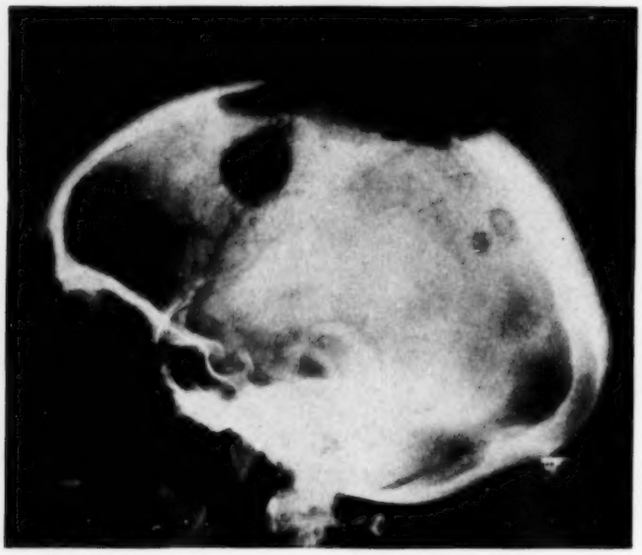
Fig. 22. Lateral projection showing tumor displacing trachea anteriorly. Postoperative death

Final diagnosis: MEDULLARY PRIMARY CARCINOMA OF RIGHT STEM BRONCHUS. Tumor mass was a gross metastasis in a mediastinal lymphnode. Old tuberculosis in lungs, pleura and bronchial nodes

epicardium and kidney. No evidence of lues. Question of false positive serologic reaction due to widespread carcinomatosis.

VON RECKLINGHAUSEN'S DISEASE: Case 11. Foundry worker, aged 50 years.

Had had cough for years, attributed to occupation. Nodules in skin. For past year had noted



NO CHEST COMPLAINTS
Fig. 23. February 13, 1935. Tumors of scalp with underlying defects in skull. Biopsy: SQUAMOUS-CELL CARCINOMA

ease of fatigue, fullness in throat, and difficulty in swallowing. During the last six months he had had hoarseness, dyspnea on exercise, and loss of weight.

Upon admission (July 2, 1935) he presented a displacement of the larynx and trachea to the left, bilateral paresis of the vocal cords and cutaneous neurofibromatosis.

Roentgenographic study revealed a gross tumor right superior posterior thorax displacing the trachea and grossly distorting the esophagus. No intrinsic lesion of the esophagus was evident. There were some minimal parenchymatous changes in the right apex and left axilla.

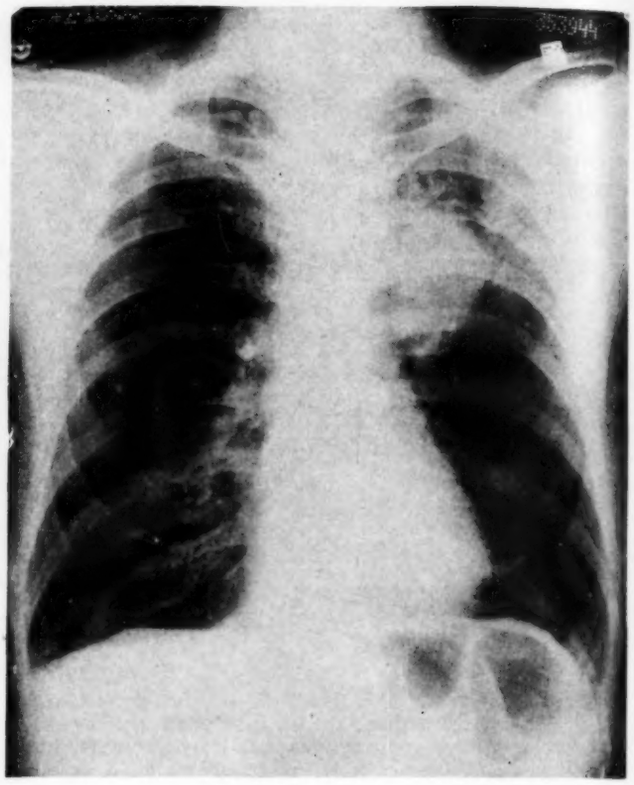
Believing this tumor to be a neurofibroma, surgical removal was accomplished, but the patient expired during closure of the thorax. Death was thought due to shock incident upon the decompression of the mediastinum.

Final diagnosis: (autopsy) *Medullary primary carcinoma of the right stem bronchus.* Metastases to lung, pleura and mediastinum. Old tuberculosis in lungs, pleura and bronchial nodes. Tumor mass surgically removed was a gross metastatis in a mediatinal lymphnode. Neuofibromatosis of skin.

TUMOR OF SCALP: Case 12. Unemployed male, aged 58 years.

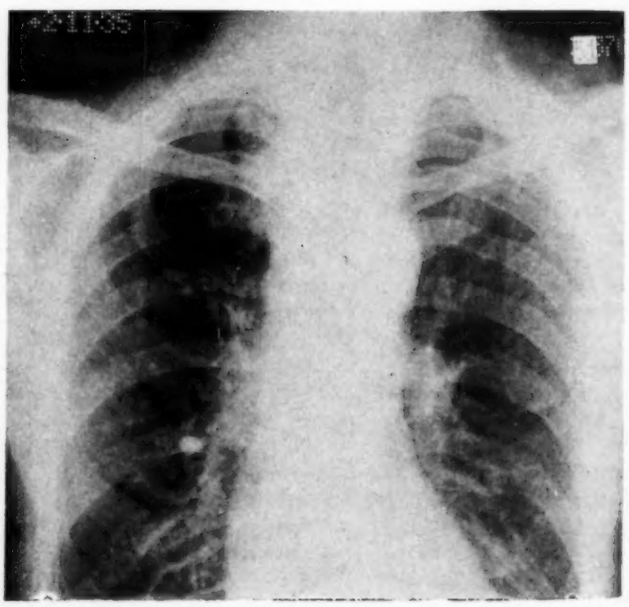
Complained of headache and masses on the scalp past six months. One of these had been incised but did not heal. No complaint referable to the chest.

Roentgenogram of the skull (February 13, 1935) revealed gross defects in the calvarium, some of which presented some characteristics of gumma. Metastatic neoplasm could not be eliminated.



CASE 12

Fig. 24. February 18, 1935. Tumor in left superior lobe perihilar, probably the primary. Improvement with x-radiation



CASE 13

NO CHEST COMPLAINTS
Clinical diagnosis: Hemiparesis, probable brain tumor
Fig. 25. February 11, 1935. Chest examination, following left osteoplastic craniotomy for cystic cerebral tumor. (Pathologist's diagnosis: METASTATIC MEDULLARY ADENOCARCINOMA) Small paravertebral infiltration right pulmonary apex. Old tuberculosis scar near right hilum. Apical lesion easily overlooked
Death, five days, postoperative

Final diagnosis: PRIMARY ADENOCARCINOMA OF RIGHT MAIN BRONCHUS

The serology was negative. Chest films five days later revealed a gross tumor infiltrating the posterior apex of the left superior lobe, and calcareous atheromata in a moderately large ascending aorta.

Biopsy of one of the nodules in the skull revealed squamous cell carcinoma. The presumptive diagnosis was a primary bronchogenic carcinoma with skull metastases. Roentgen therapy was followed by an improvement in the skull lesions. No report from patient since the second month.

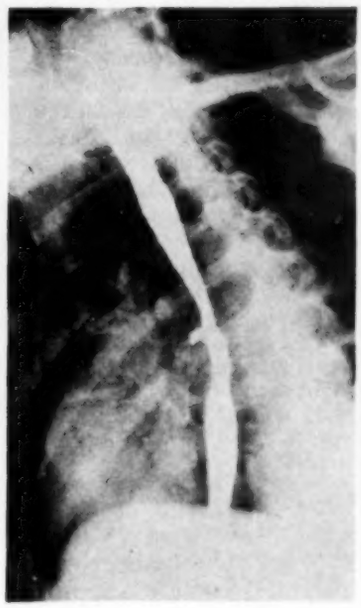
HEMIPARESIS: Case 13. Retired male, aged 59 years.

lymphnodes. Mixed tuberculous and neoplastic involvement of right apex and mediastinal glands.

CARCINOMA OF THE ESOPHAGUS: Case 14. Foundry worker, aged 50 years.

Complained of difficulty in swallowing food, progressive for three months with obstruction to liquids during the two weeks before admission. Loss of 30 pounds in weight.

Roentgenographic examination of the esophagus (September 30, 1935) revealed an obstruction at the level of the 7th and 9th thoratic vertebrae, not always constant in shape, with a tapering upper



CASE 14

Fig. 26. September 30, 1935. Difficulty in swallowing, progressive. Obstructing and stenosing lesion of mid-third of esophagus. Considered primary carcinoma of esophagus. Esophagoscopic biopsy: INFILTRATING MEDULLARY CARCINOMA. Radium therapy in esophagus. Clinical improvement for three months

Fig. 27. February 18, 1936. (Left anterior oblique) Resumption of fairly good caliber of lumen of esophagus with pulsion diverticulum, moderate parenchymal reaction left base.

Fig. 28. Same date. (Weakness of leg and foot. Some cough and sputum). Minimal peritruncal and pleural involvement left base. Death four days later

Final diagnosis: UNDIFFERENTIATED CARCINOMA OF LEFT MAIN BRONCHUS, WITH EXTENSION TO THE ESOPHAGUS

Difficulty in use of right hand beginning in December, 1934, progressive. Convulsive seizure on right in February, 1935, with subsequent right hemiparesis, severe headache, disorientation, dizziness.

The clinical diagnosis on admission a few days later was "neoplasm, left motor cortex."

Through a left osteoplastic craniotomy a cerebral tumor, cystic, was excised. The histologic diagnosis was metastatic medullary adenocarcinoma.

Chest films demonstrated a calcareous bronchial node in the mid right lung and a small soft peritruncal infiltration in the mesial right apex, overlooked by first inspection. This could well be interpreted an minimal tuberculous lesion.

Death occurred five days postoperative.

Final diagnosis: (autopsy) *Primary adenocarcinoma of right main bronchus.* Early perivascular infiltration into lung. Metastases into both lungs, right adrenal and kidney, cervical and mediastinal

margin but sharp edge inferiorly. Considered carcinoma of the esophagus. No evidence of gross extrinsic tumor.

Esophagoscopic biopsy revealed an infiltrating medullary carcinoma.

The patient improved after radium therapy, intralumenal, to the degree of a normal dietary three months later. But in another two months he had anorexia, dyspnea, cough and sputum, with some weakness of the right leg and foot.

Death occurred on February 22, 1936.

Final diagnosis: (Autopsy) *Undifferentiated carcinomia of the left main bronchus* with extension to the hila, pulmonary vein, thymus, mediastinal and periaortic nodes, and the esophagus. Metastases to the left adrenal.

The last two cases serve exceptionally well as examples of the absence of symptoms referable to the lungs, and the minimal evidence of pulmonary or intrathoracic involvement with local or distant metastases of importance.

Summary

THIS survey of a relatively small sample emphasizes the protean character of the clinical and roentgenologic manifestations of primary bronchogenic carcinoma.

For this reason this neoplasm must be included in the consideration of a differential diagnosis in virtually all patients presenting symptoms referable to the thorax. However there is an occasional striking lack of any semblance of the anticipated syndrome.

So far as we can determine there is no constancy in the roentgen pattern.

The insidious character and possible imitation by bronchogenic carcinoma of other, less-grave disease must be borne in mind in any survey by means of chest roentgenograms. Fourteen cases have been presented in detail in illustration of that imitative character.

Periodic Examinations

—*of Industrial Employees*—

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IN RECENT years there has been rapid advancement in industrial medicine in every kind of industry.* The machine age has not lessened the human element or the economic importance of the health and physical condition of the operatives, so we must face the facts as they exist, with a full realization of the importance and bearing the health of the operative has upon the efficiency of any industry and the proportion of profit or loss to the company paying for services.

It is of first importance to remember that every operative in whatever industry employed costs the company, or employer, considerable outlay for training and experience, and, having received this schooling (as it were), the loss of service for whatever cause is an important item. The employee who is skilled is of much more value than the one who has just begun service. The novice may be careful and willing, but he has no training and, therefore, less judgment. It has been estimated in railway service that an engineer who has reached the age of 55, or has had 20 to 25 years service, has cost the company $10,000 for his training. His service is thus much more valuable than if he were without experience, and it is important to see that such a man is kept fit for service, especially since he has reached the age when certain physical changes begin to make their insidious inroads in his physical make-up—arterial changes, renal pathology, and, changes in the general vascular and nervous systems.

Physical examinations should be classed as:

1. Entrance examinations, for those making application for entry into service; and
2. Periodic examinations, for those already in service and needing to be kept physically and mentally fit as long as possible, especially those who have been in service a long period of years.

PHYSICAL examinations for entrance into service should be thorough but not too exhaustive. After some experience a thorough examination can be done quickly. Systematic inspection will reveal much. All clothing removed, one can tell almost at a glance whethere is average development, asymmetry, astrophies, scars, deformities, postural irregularities, evidences of old injuries—fractures and the like, chest and abdominal irregularities, and spinal deviation; and can note the condition of the hands and feet, fingers and toes, head, neck, eyes, nose, mouth including teeth, throat, and ears. Then comes the examination of heart, lungs, and abdomen, and the testing of joints including the spine, with a watchful eye always for luetic and tubercular infection, and a short personal history as to previous disease, fimilial tendencies, and previous occupation, and, I think, by all means, a urinalysis.

With ordinary care the examiner can place average healthy men in service to start with, and this means a great deal in maintainance of future health among the employees with less sick and injury disability loss to company and employee.

Examinations of this kind should not require much time, but whatever time is required should be taken, and the examiner should be alert and not worn out when making them. The company is not too exacting, but it wants good service and should have it—such service as can be given only by healthy, strong, alert men, as free as possible from physical and mental handicaps.

The Southern Railway in 1907 instituted physical examinations, and has continued the practice with very little modification since that time. These have been carried out with advantage to the company and, so far, its personel physical conditions measure up. There are fewer injuries and more efficent service: man-power has improved physically and mentally with improved equipment, and this man-power improvement is the result of the physical examinations. These examinations have been for admission only, with no other examination—except in recent years for some of the oldest and possibly disabled employees whose physical condition has caused apprehension as to their ability to meet the demands of the positions in which they serve. The examination does not include eye examination, which is a special branch and a very important one, and is reported on a separate form.

PERIODIC physical examination was a much discussed and for a time a much opposed question in industry up to a few years ago; but in the last 10 to 15 years, industrial medicine has made rapid advancement and is now occupying an important place in all branches of the industrial world. The attitude of the employee toward these periodic examinations was antagonistic, and many of the examiners seemed to have the idea that they were intended to disqualify the employee rather than keep him in service for a longer period and improve his efficiency. This, of course, is the wrong idea, for the intention is just the opposite.

Since the inauguration of health examinations by many insurance companies, and similar examinations in many manufacturing industries, this attitude has been changed to a great degree by the education of the public to the need of the care of health. The great corporations have invested much in the training of employees and the weeding out of the incompetents and the incom-

* President's Addess, Association of Surgeons of the Southern Railway System, Annual Meeting, Jacksonville, Florida, June 8, 1937.

patibles, and so it is to their interest to keep the trained expert in the highest state of efficiency for work; and it is of just as much importance to the worker to be physically and mentally fit and capable of giving the best service, thereby increasing the profit to the one and earning power to the other—a great economic factor in preventing disability loss to both.

Some of the larger industries have installed quite extensive laboratory equipment, the better to carry out this work in connection with diagnosis. In some instances this includes x-ray as well as special medical service. So they must have found that it pays to keep their operatives in good condition, and to preserve the high state of efficiency in those who have been trained, with less loss of time from sick and accident disability.

The relationship of the doctor to the employee and the company is a peculiar one and requires much tact. He should be conscientious: just to the employee—who should be made to feel that he is of quite as much a concern as any private patient—and always loyal to the company, which is depending upon him to be an important factor in keeping the organization intact. The education of the employee in this regard depends to a great degree upon the doctor. As long as the employee is made to feel that his job is in danger and the doctor is a means of throwing him out, there is not going to be cooperation on his part. But if he can be made to see that the examination is chiefly in his interest, as a means of keeping him in health and earning capacity, of locating anything that might disable him, and of putting him in the way of ridding himself of this handicap before it becomes serious, it will bring results. If we can get the confidence of the men, then we can do much for both men and company.

When a man takes out insurance he feels that he is doing something for himself and his family. If we can get him to regard periodic examinations in the same way, it will be a great step forward. The examiner should take the problem up with the same idea, and when any suspicious sign appears or there are definite symptoms of beginning physical pathology, the employee should be advised of the finding and told of the danger if this is not taken in hand promptly. Suppose there were to be a slight heart change, or symptoms of early kidney disease, or any abnormal nervous phenomena, or suspicion of lues, or arterial change. Then the employee should be referred to his own medical adviser, with a statement from the examiner of his findings and a request for a report of progress at intervals. This places both the family physician and the examiner in a pleasant relationship, and they will cooperate in their efforts to make the patient fit for service.

It is of the greatest importance to have a clear cut understanding between the industrial examiner and the family (personal) medical adviser. The limitation of the industrial physician should be understood and strictly observed. The industrial adviser does not treat the case, but cooperates with the personal physician in getting the man to have the necessary care and continuing the treatment as long as necessary. Subsequent examinations can be made, when necessity arises, with the knowledge of the personal physician. This procedure should maintain the kindest relationship between all interested, the patient, the personal physician, the industrial surgeon, and the company.

In the case of injury, however, where the employee is hurt in service and in the discharge of his regular duties, where the company assumes the responsibility for first aid and after care, the industrial surgeon takes the whole responsibility. He may report it to the family attendant if desirable, and show all courtesy as in a private case. Or, if desired by the patient and his family, the patient may be turned over to the personal physician, who then takes charge and cares for the patient as in a case of illness.

Periodic examination is a good practice in any walk of life, as is shown by the yearly periodic insurance examinations. But trained operatives are an important asset to the profitable operation of every industry, and a well and normally-functioning body is most important.

To me it appears that a good practice would be to begin regular examinations at 40 years, and then make them every three years up to 49, every two years from 49 to 55, and after 55, every year. This would not work a hardship on anyone, and would be of much benefit to the employee and the company. A certain class of employees have been required to have eye examinations at intervals, i.e., those having one eye must report once a year, and those having glasses every three years. But to me it seems that a regular period for all those in the operating department would be a much better practice for all concerned. There is a regulation for certain handicaps in vision that requires yearly examination for eyes only. This is a definitely adopted scale in eye examination alone, but our plea here is for regular periodic check-ups for all employees over 40 years of age. There is no doubt but that many of the most valuable men would be kept in efficient service much longer by this kind of check-up.

The employee who has spent the greater part of his productive years in the service should be kept in it just as long as keeping him is safe for himself and his employer. Simply because a man has reached 60 or 65 years is no reason why he should be disqualified; there should be ample and sufficient reason other than his age alone for removing an employee who is active mentally and physically. As long as vision is good, hearing average, and physical ability average, an old man is just as safe as, or possibly more safe than, a young man. The one important factor is safety to the persons, property, and equipment entrusted to the employee.

The company should not incur undue risks on account of incapacitated men in responsible positions, but at times it is difficult to disqualify a faithful employee at any age. When this becomes necessary, however, it is due the employee to be told the truth, and to try to make him understand the facts. Such an employee, who has grown old in service and has become disabled, should be provided for; all those who come into this class should have some provision made by which they can live without charity, whether it is pension, insurance, or other plan.

The Railway Retirement Act will be a great boon in this respect to many who have not been provident, or who have been so unfortunate as to lose their savings. The means of its provision are now being successfully worked out.

BUT the main issue at hand, as I see it, is the conservation of our trained employees, with the thorough and congenial understanding between them and the company:

That it is a great advantage to both to have periodic examinations;

That it is well worth the expense to prolong the service of a trained employee;

That this kind of service is the most profitable, in that the company is enabled to give more efficient and much safer service; and

That no examination is made with the idea of depriving any man of employment, but, on the other hand, to make possible that employment for a longer period of years.

Open Bone Operations

—*For Fractures*—

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THIS topic has been a live one for discussion for many years and bids fair to continue as a forum subject for many years to come.* The unyielding side of the surgical profession is not in full sympathy and accord with those members of the profession who are performing open bone operations.

I desire to point out that our railway surgeons in the larger centers of population are specialists in performing open bone operations. Much of this has been done by our surgeons in order to obtain more satisfactory end-results.

Many of the surgeons in the larger centers of population have frequent opportunities of performing open bone operations and comparing their results with results obtained by other methods. The experiences of railway surgeons in this line of endeavor, if reduced to writing would make most excellent contributions to any surgical library.

I cannot offer you the solution of this surgical problem, but I can call your attention to a few outstanding facts which should be of help to you in the consideration of the question. These facts are grouped under two heads:

Those which favor, suggest, and recommend to the surgeon the open operation, and

Those which discourage, deter, or otherwise render impracticable the open bone operation in the treatment of fractures.

When you see some poor cripple who has been attended by a good surgeon and yet has a poor result, you may be inclined to believe that more might have been done for the unfortunate one, and the maiming lessened, had the surgeon been bolder or a better mechanic. But when you see these poor end-results coming in from under the professional care of excellent doctors your mental attitude is changed. Fixed methods and routine treatment should give way to more radical treatment, in the hope that better end-results may be obtained.

In dealing with all fractures a definite diagnosis should be made, the position of the fragment should be known, complications, if any, should be carefully studied, and the treatment should be so comprehensive as fully to cover the situation,—it should give reasonable assurance of a good end-result. The thoughtful surgeon makes use of all of his knowledge and of all material things about him to correct and reduce a fracture and to maintain its position and alignment; but in the exercise of his judgment and the application of his skill wthout making use of the open bone operation, he often fails; and these failures are the ones you see walking upon the streets, the ones that lead you to conclude that the utmost in surgery has not yet been done. Failure of union, or fibrous union; poor co-aptation, or no co-aptation; poor alignment, or unsightly deformity, are always serious consequences.

THE open bone operation is a surgical achievement of necessity, and rarely ever an operation of election, though there are a few outstanding cases which suggest an immediate open bone operation. An analysis of more than 100 fractures, as they occurred in industry and transportation, show that 11% are compound. These cases should be considered as enforced open bone operations, as they partake of all the principles involved in elected open bone operations, and more, —to wit, probable infection.

Four per cent of fractures, after eliminating compound fractures, are complicated by severe laceration of soft structures, comminution, hemorrhage, etc. Such fractures cannot be finally disposed of with permanent dressings. These cases are very troublesome, and should invite the further consideration of being changed into compound fractures and treated as such.

The sum total for consideration is thus about 15%, which is quite a large percentage; and extra surgical procedure, such as the open bone method, is suggested for their relief and cure.

Open bone work has been made a last resort for some time for the following reasons:

That an extra hazard is added—*probable infection;*

That criticism is encountered,—from members of the profession who are not skilled in the surgery of bones.

That industrials condemn the practice,—alleging exhorbitant fees; and

That in case of failure after the open bone operation the consequences are greater and the likelihood of malpractice proceedings brought nearer.

In an analysis of all that can be alleged against open bone operation, let me say here and now that open bone surgery on fractured bones is not *wayside surgery*, but such work as should be done by skilled and gifted men in the best regulated hospitals and under the strictest antiseptic precautions. If this line of work is to succeed, it will be at the hands of the most skillful men. If it is sent into the hospital, and only the more skillful men employed in operating, the results will be most excellent, and infection exceedingly rare—so rare as to be negligible.

That aggression and experimentation are not foremost in thought is evidenced from the fact that all knowledge and material things should be fully tried before undertaking the open operation. Consultation should be had and roentenegrams should be studied before added surgical procedures are undertaken. After all of this fails in effecting a reasonable reduction and retention, then an open bone operation is advisable.

* Presented at the Annual Meeting of the Association of Surgeons of the Southern Railway System, Jacksonville, Florida, June 8, 1937.

There can be no doubt that criticism is encountered. I want to call your attention to the fact that the personal equation, as to operators, is an immense factor in end-results. There are good surgeons who can, and good ones who cannot, do open bone work. There are men who are so situated as to have all the necessary hospital apparatus, trained hospital intern staff, and operating bone judgment. And there are men who have the knowledge, judgment, and ability, but who are so situated as to be wholly unable to do open bone work—on account of a lack of facilities. This lack of facilities—poor judgment in undertaking such work—is the very thing that invites criticism.

Industrials should object when bills are presented that are out of all reason. And this often occurs, but not among the more skillful. It occurs, as a rule, where such work is rarely done and on account of being seldom done, is over estimated—naturally, the rarer the work the richer the price. An idea of the fee may be had in this way, and while it is not always correct it will serve as a rule:

Simple fracture—see fee-bill.

Compound fracture, two and one-half times simple fracture.

Open bone operation, same as compound fracture plus simple fracture, or three and one-half times the fee of simple fracture.

FEW failures are recorded when such operations are performed by skilled surgeons in well equipped hospitals. And in the event of failure there is this satisfying thought: that all was done that could be done, that consultation and careful study of the case were had, and that the results, while not gratifying, are better than they would have been by any other method.

It is well to tell the injured and obtain his approval before undertaking an open operation, to explain to him the reason therefor and tell him what failure means, and to explain to him his impaired usefulness by other methods and how likely it is to occur. Then, and only then, can you successfully resist court proceedings.

Thus have I analyzed the objections to the open bone operation. Now let's set up the surgical achievements. Open bone surgery should be undertaken in all fractures where other methods have failed, such as:

Irreducible fractures impinging upon delicate organs;

Fractures that sacrifice function;

Fractures that grossly impair usefulness;

Fractures that are frightful in personal appearance; and

Fractures that are grossly deforming.

All these cases, and many kindred ones, though unpromising at sight, yield most gratifying results by the open bone method in the hands of skilled surgeons. This plea is made that surgeons may turn their attention to, and make a careful study of, open bone operations; that poor end-results and large damage suits may be lessened, and that the unfortunate one may be of greater economical value to our people.

The implied criticisms to be found in this paper should not be construed as *caustic*, but nevertheless they are sufficiently specific to invite closer study of any fracture case before you operate. And:

1. Do not attempt operating procedures without suitable facilities and competent assistants.
2. Do not operate without having made a thorough and complete diagnosis.
3. Do not operate without having considered your end-results.
4. Do not operate for monetary considerations.
5. Do not operate in marked opposition to industrialists, kinsmen, or the patient himself.
6. Do not operate unless you feel reasonably certain that by such procedures the patient would be greatly benefited.

Preventive and Industrial Medicine and Public Health

—Next Steps in Organization and Administration—

— Chairman's Address —

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CUSTOM and precedent make it possible for the chairman of a section of the American Medical Association to develop his address either from the strictly scientific or from the more philosophic point of view. In choosing the latter course one may assume the rôle of a historian, describing past or recent trends; a reporter, recording present status; or an amateur prophet, dealing with next steps. In spite of the hazards of attempting to chart the unknown medical "seas" of the future, 30 years' experience, including private practice, the teaching of preventive medicine, the administration of state, county and local health work, and more recently the field of industrial hygiene, have made possible a few brief suggestions as to some of our immediate objectives in the further organization and administration of preventive and industrial medicine and public health.

Preventive Medicine

THE dividing line between curative and preventive medicine in the future will be less and less evident; the so-called healing art will become decreasingly pathologic and increasingly physiologic; the clinician and the hygienist will take up arms together in a common cause wherein voluntary and state efforts are more adequately interlocked.

In the field of preventive medicine, the somewhat hesitant steps already taken in some communities to make the doctor's office a real health center and his private practice a focusing point for the modern application of preventive medicine should be strengthened into the firm, sure advance of a well organized program. In this connection there is great need for a community demonstration to bring out the amount and kind of preventive services that should and can be offered successfully by the physician as a part of his regular practice and to determine how best to "sell" the idea of the private practice of preven-

* Read before the Section on Preventive and Industrial Medicine and Public Health at the Eighty-Eighth Annual Session of the American Medical Association, Atlantic City, N. J., June 9, 1937; published in *J.A.M.A.*, July 24, 1937.

tive medicine to the public so that the doctor's clientele in the future will demand from him and be willing to pay him not only for curative treatment but also for individual health protection and promotion. To this end it is suggested that, with the study, guidance and sponsorship of the American Medical Association and the possible financial participation of one of the philanthropic foundations, a county medical society demonstration be organized to carry on an active experiment of this nature for a period of five years, the selection of a county society for such a proposed demonstration to be based on (*a*) a careful, preliminary survey of all county societies that might be interested and (*b*) the cooperation of associated state and local official and voluntary medical and health societies and boards.

Medical Economics

SUCH an organized program of preventive medicine and individual hygiene undoubtedly would point the way to the ultimate solution of the most important health problems of the present day; namely, those insidious scourges of advancing years—diseases of the heart, kidneys and blood vessels, cancer and various nervous and mental instabilities, to say nothing of the ever important communicable diseases. At the same time, such a county medical society demonstration might be so organized as to help answer many questions with reference to the economics of medical care and the responsibility of the public for those unable to provide the medical care they need out of their own resources. The organized medical profession should assume the leadership in the development of a health and medical program which will satisfy the needs and demands of the general public, from the broad aspects of modern sociology and economics.

If majority and minority committee reports on the costs of medical care have been inevitable, how necessary and desirable it would seem to be for majority and minority experiments and demonstrations to be carried on in the field of medical economics! The next five years should be looked on as a period of active trial and critical evaluation of all reasonable plans in the interests of public security against sickness and the conservation of public health; in this connection, the American Medical Association should be prepared to defend its own position and beliefs through a well organized community demonstration, as suggested. Local medical and dental service bureaus for the adjustment and instalment settlement of bills and local associations for the provision of group prepayment of hospital bills are initial steps already taken in several communities toward the more complete coverage of those with smaller incomes who require preventive and curative medical services and more adequate economic security.

Industrial Medicine

THERE are at least four steps that might be suggested as desirable in the future development of industrial medicine, and these may be presented briefly as follows:

1. Industrial medicine of the future must place more and more emphasis on prevention; we should think in terms of industrial health. The "company surgeon" undoubtedly will still have a function to perform, in view of accidental injuries and compensation problems, but "next steps" should involve the more active direction of industrial health programs by physicians well trained in health and preventive medicine, with the assistance of industrial engineers, psychologists, nurses, nutritionists and other personnel that may be required. Mere attention to occupational disease must give way to the active promotion of occupational health. Attention to the prevention of tuberculosis and syphilis and of various types of emotional maladjustment and actual mental disease must become as active in the industrial health program as in the public health program in general; and much of the same methods of control should be inaugurated in cooperation with community authorities.

2. In order to make available well trained industrial health leaders, an important step that must be taken is the better and more general teaching of this subject in our schools of medicine and public health. The growing importance of industrial health would seem to warrant the placing of this branch of instruction under its own independent development in schools of medicine and public health, through a separate department and professorship of industrial health. In a detailed survey I[1] found that only thirteen out of eighty-five medical and public health schools in the United States and Canada give separate courses in industrial hygiene. While a number of other schools assign one or two lectures to this subject in their course on preventive medicine, twenty-one schools apparently give no instruction whatever on industrial hygiene or industrial medicine. There also would seem to be a real need for a cooperative demonstration between local medical schools and industrial organizations in the newer fields of social hygiene and mental health, in order that suitable programs under expert medical guidance may be forthcoming for the benefit of the great mass of the working population.

3. Possibly the most needed step for the further development and administration of industrial health services is the putting into practice of a recently suggested plan[2] or method for the measurement or appraisal of industrial health and safety activities. A subcommittee on industrial health appraisal of the Committee on Administrative Practice of the American Public Health Association has solicited the wide use of a preliminary trial appraisal form by industrial organizations. As chairman of this subcommittee, I may state that we shall be glad to receive suggestions and recommendations from those who have any practical experience with this tentative form so that, on the basis of group experience, a revised, standardized and official form for the appraisal of industrial health activities may be adopted in the near future.

4. While an appraisal form for the survey and measurement of an industrial health program, as mentioned, will be of prime assistance to company management and personnel directors in the development and follow up of their health pro-

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1. Bristol, L. D.: The Teaching of Industrial Hygiene, *J.A.M.A.* 102: 990 (March 31) 1934.

2. Bristol, L. D.: An Appraisal Form for Industrial Health Service, *Am. J. Pub. Health* 22: 1263 (Dec.) 1932; Appraisal of Industrial Health Activities, *Indust. Med.* 2: 85 (Aug.) 1933; Measuring the Industrial Safety Program, *Personal J.* 13: 193, 1934; Practical Application of an Industial Health Appraisal Form, *Am. J. Pub Health* 26: 390 (April) 1936.

gram, another step that is much needed is the inauguration of a plan by the American Medical Association whereby the quality and quantity of medical services performed in industrial medical departments may be surveyed, measured and possibly approved and certified. This would seem to be a logical field for the influence and guidance of the entire organized medical profession of the country, which represents, through its association, the work of the general practitioner and all the important specialties.

The rapidly increasing organization of bureaus of industrial hygiene in state and local departments of health during the past year, the passage of laws in several states providing workmen's compensation of certain occupational diseases, the need for defining the functions of health and labor departments as pertain to activities in this field, the questions as to the relative positions of the physician and the engineer in the industrial health program, the proper relationship between industrial medical departments and the private practice of medicine, the better balance between health and safety activities in industry, the problem of how best to furnish much needed industrial health and medical services to the vast number of small business concerns and the constant requirement of improved medical and surgical technic in industry would seem to call for continuous expert thought and advice on the part of the American Medical Association, analogous to that given to medical education and hospital administration in the United States. There is every reason to believe that the management of private industries and various other agencies, official and voluntary, might welcome the guidance of the American Medical Association in things medical, just as have public and private institutions of learning, hospitals and other organizations. The creation of a Council on Industrial Health by the American Medical Association would be a much needed forward step. Representatives of industrial management and labor groups might be invited to serve as consultants or advisers to such a council.

Public Health

JUST as each doctor's office should become a health center for the private practice of preventive medicine, so also his office should at least in part become a branch office of the local health department. Only in this way will the public health obstacles of the present and future be overcome. The control of pneumonia, syphilis, mental disease and various other disorders await the more active partnership of private doctor and public health officer. Not until the practicing physician assumes as much obligation and responsibility to the public as he does to his private patient will these problems, which are now pressing for solution, be solved. Moreover, it behooves the private practitioner to go at least half way toward the health department in a spirit of cooperation. In the interest of the better and more complete health and medical care of all the people, the gap in the organized care of the sick must further be closed; the best way to meet the need is for practicing physicians and health authorities to approach one another on the common ground of an active, coordinated program with the financial backing of the public, where necessary.

City health administration of the future must become more and more decentralized, with the possible development of neighborhood health districts and full-time district medical officers. Under suitable medical auspices and guidance the city health district plan already in operation in one or two localities could be followed to advantage in many of the large cities. Committees of coordination made up of private physicians and public and voluntary health representatives should be set up for purposes of advisory supervision. Not only industrial health services, but local city health administration in general, should be closely integrated in the future with the curriculums and courses of local medical and public health schools, so that adequate training centers will be available for the education of prospective physicians and health leaders. Industrial medical departments and city health units should be the practical training and research grounds for the teaching of preventive and industrial medicine, just as are hospital wards for clinical or curative medicine.

While city health administrative units of the future should be contracted and increased in number, rural health units must be expanded and decreased in number. In this development (a) the state department of health, with federal financial assistance where necessary, should assume more authority, through state health districts or bureau, over rural health administration; or (b) the county should be recognized as the smallest unit for rural health work, or (c) the town health union plan, wherein several small rural communities combine as a unit for health and hospital administration, should be endorsed, based on local conditions and needs. No one pattern for rural health administration seems practicable and feasible for all sections of the United States. The one thing which is evident, however, is that the small town, isolated, part-time, underfinanced local health department, without trained leadership, is entirely out of date; and in many communities aid from Social Security funds and an increasing interest in rural affairs, the farmer of the future is bound to demand much more and better health protection than he has had in the past.

Whether or not public health degrees, based on special courses in public health, should become prerequisites for appointment to public health positions of leadership is a question that must receive careful consideration in the future. There would seem to be little logic in maintaining highly organized and endowed schools of public health for the granting of such degrees if they are not to be required of specialists in the field.

When better federal, state, local, industrial, collegiate and voluntary health services are built for the benefit of the people of the United States, let us hope that the American medical profession and its representative Association will have a large part in building them.

Abstract of Discussion

DR HOLMAN TAYLOR, Fort Worth, Texas: I am delighted to be able to make the report which the chairman requested. The House of Delegates yesterday unanimously approved the idea of a Council on Industrial Health, and the Board of Trustees agreed to set up such a council. The development of such a council will be along the lines of the other councils. I hadn't thought of it so directly before; Texas is not, in the strict sense, an industrial state, and yet there are many industries there.

There are the oil industry, gas, and marble and granite quarries. Some time ago our health department established a bureau of industrial hygiene, and a very fine physician was placed in charge. He came to me as secretary of the state medical association for a discussion of his set-up. I asked him to work up his plan of procedure so we could see it, and perhaps prevent any unfortunate repercussions from the practicing physicians or from industry itself. The plan eventually evolved did that.

DR. STANLEY NICHOLS, Asbury Park, N. J.: It might interest this section to hear of the five year experience we have had in New Jersey with a modification of Dr. Vaughan's plan of organized medical participation. The Medical Society of New Jersey started, after the White House Conference on Child Health and Protection, five or six years ago, on this program. In developing a program of this sort, the state medical society and the state department of health must get together on common ground and build from that foundation. There have been many approaches to this problem, and some of the functions of the various components in such a public health participation are not yet clearly understood by the family physician. There are two things that a family physician must do: One is that, as an individual physician, he must furnish preventive medical care to all his private patients. That is the fundamental part of this program. Second, as a member of his county and state society and of the American Medical Association he must be ready to furnish medical service to all indigent and low wage groups needing medical service, on terms that are suitable to the organized profession. In New Jersey we are building on that basis and have the cooperation of the state department of health. The fundamental plan that we have set up is that the doctor, the dentist, the nurse and the medical social worker are projected as the medical service part of a triangle. The second part consists of the official public authorities, whether they are the board of health or the board of education or other public authorities. The third part, and the part that can best "sell" this plan, consists of the lay health agencies, with whom in the past the medical profession had no working relationship. Such a triangle of the administrative groups, the medical service groups and the "salesmen's" groups, the lay agencies, can together do any needed piece of public health work. We have developed, with the help of Social Security funds, our New Jersey plan to preserve the private practice of medicine and to furnish the needed medical service, working together with the public authorities, for the large indigent and low wage group which cannot be carried by the private practitioner any further without assistance. By using Social Security funds, through the close cooperation of our state department of health, we are training our individual doctors both by didactic literature and courses and by using baby health stations, maternal welfare clinics, and tuberculosis and venereal disease clinics as training centers for the practice of preventive medicine by each physician.

American Railway Surgeons

THE American Association of Railway Surgeons will hold its 1937 Annual Meeting on Monday, Tuesday, and Wednesday, September 20, 21, and 22, at the Palmer Hotel, in Chicago. DR. ARTHUR R. METZ, Chief Surgeon of the Chicago, Malwaukee, St. Paul & Pacific Railroad, has the Program in charge. It is expected that this Program will appear in full in our August issue.

Traumatic Surgery Institute

AT THE Annual Meeting on June 24, 1937, the Institute of Traumatic Surgery elected officers and directors as follows:

DR. KELLOG SPEED, President;
DR. EDWARD C. HOLMBLAD, Vice-President;
DR. JOHN D. ELLIS, Secretary-Treasurer; and
DR. FRANK P. HAMMOND, Chairman of the Board.
DR. HARRY E. MOCK, DR. R. A. JACOBSON, and DR. WILL F. LYON were elected to the Board.

The Institute has plans for four meetings during the next 12 months, each at a different hospital.

New York Central Surgeons

FOLLOWING is the Program of the 1937 Annual Meeting of the Association of Surgeons of the New York Central System, to be held Monday, Tuesday, and Wednesday, September 13, 14, and 15, at Hotel Cleveland, in Cleveland, Ohio:

Monday, September 13

9:00 A.M.—Registration and Information Bureau, Mezzanine floor.
All-day Golf Tournament, Shaker Heights Country Club (Must tee off by 3:00 P.M.).
2:00 P.M.—Ladies' Acquaintance Tea, Rose Room in main lobby.
8:30 P.M.—Informal Reception to the President of the Association, DR. GEORGE P. MYERS, in the Ballroom on the Mezzanine floor (including dancing and refreshments).

Tuesday, September 14, Scientific Session:

8:30 A.M.—Registration continued at Registration Desk on Mezzanine floor.
9:30 A.M.—General Meeting, Convention Hall — Ballroom on the Mezzanine floor.

1. President's Address: DR. GEORGE P. MYERS, Medical Director, New York Central System, Detroit, Michigan.
2. "Disabilities about the Shoulder Joint"—DR. WALLACE DUNCAN, Cleveland, Ohio (Illustrated by lantern slides).
3. "Hernia, Inguinal and Femoral: an 'Autologous' Fascia Suture Technique" — DR. ROBERT C. AUSTIN, Dayton, Ohio (Illustrated by motion pictures).
4. "Hypertension and Coronary Disease" — DR. R. W. SCOTT, Cleveland, Ohio (Illustrated by lanteurn slides).
5. "The Railroad Surgeon's Relation to Occupational Diseases"—MR. O. G. BROWNE, Assistant General Claims Attorney, New York Central System, New York City.

12:30 P.M.—Oculists' Luncheon and Meeting, Rooms 1 and 3 on the Mezzanine floor.
2:00 P.M.—General Meeting (Scientific Section) reconvened, Convention Hall—Ballroom on the Mezzanine floor.

1. "Skull Injuries"—DR. NORRIS W. GILLETTE, Toledo, Ohio.
2. "Desirability of an Early Diagnosis in Mental Instability in Railroad Employees" —DR. W. O. MCMILLAN, Charleston, West Virginia.
3. SYMPOSIUM:
   "Abdominal Emergencies Associated with Industrial Accidents"—DR. A. M. DICKINSON, Albany, New York.
   "Injuries to the Abdomen"—DR. FRED W. BAILEY, St. Louis, Missouri.
   "Traumatic Injuries of Abdomen"—DR. E. J. REILLY, Campbell, Ohio.
   "The Emergency Abdomen"—DR. M. E. GRIFFITH, Monessen, Pennsylvania.
4. "Fractures of the Os Calcis"—DR. C. W. WOODALL, Schenectady, New York.
5. "The Use of Local Anesthetic in Railroad Surgery"—DR. W. J. CARTER, Mattoon, Illinois.
6. "Hypertension in Periodic Examination"

—DR. R. W. COTTON, McKees Rocks, Pennsylvania.

7. "The Role Played by the Physician in the Production of a Traumatic Neurosis" — DR. J. N. FREDERICK, Pittsburgh, Pennsylvania.

Tuesday, September 14, Business Session:

Reports of Committees.
New Business.
Election of Officers.

7:30 P.M.—Annual Dinner in the Ballroom on the Mezzanine floor. MR. FRANK V. WHITING, Toastmaster.
Distribution of golf prizes.
Music, entertainment, and dancing.

Wednesday, September 15, Clinical Session:

8:30 A.M. to 10:30 A.M.—Operations by Lakeside Hospital staff, Lakeside Hospital, University Circle.

10:30 A.M. to 12:30 P.M.—Dry Clinic, Ampitheater:

1. Remarks on Surgery of the Gall-Bladder" —DR. CARL H. LENHART.
2. "Cardiac Trauma"—DR. CLAUDE BECK.
3. "Bone Repair in Relation to Fractures and Disease"—DR. MAXWELL HARBIN.
4. "Hyperparathyroid Disease" — DR. JOHN HOLLOWAY.
5. "Newer Methods of Treatment of Fractures of the Hips"—DR. RUSSELL BIRGE.
6. "Amplified Percussio Studies on Bone Healing"—DR. W. H. McGAW.

Wednesday, September 15, Clinical Session:

1:30 P.M. to 3:30 P.M.—Operative Clinic, Cleveland Clinic Hospital — (Details to be announced later):
DR. GEORGE W. CRILE;
DR. WILLIAM E. LOWER;
DR. THOMAS E. JONES;
DR. ROBERT S. DINSMORE.

3:30 P.M. to 4:30 P.M.—Demonstration of cases.

Pan American Medical

DR. JOSEPH JORDAN ELLER, Director General of the Pan American Medical Association, sends the following announcement of the Seventh Cruise-Congress of his organization.

"The Pan American Medical Association takes great pleasure in announcing that the 'Queen of Bermuda' has been chartered for the Seventh Cruise-Congress. As you know, we had this boat for the last Cruise and it proved to be most ideal for our purposes. Following is the itinerary:

Leave New York	January 15,
Arrive Havana	January 18,
Leave Havana	January 23,
Arrive Port au Prince	January 24,
Leave Port au Prince	January 24,
Arrive Trujillo City (Santo Domingo)	January 26,
Leave Trujillo City (Santo Domingo)	January 26,
Arrive San Juan (Puerto Rico)	January 27,
Leave San Juan (Puerto Rico)	January 27,
Arrive New York	January 31.

"The main part of the Congress will be held in Havana. There will be three days of scientific sessions with operative clinics. These will be divided into sections for the various specialtes. Ths year we have four new sections: Tuberculosis; Gastroenterology; Dentistry; and Industrial Medicine and Surgery. Meetings will be arranged with our medical colleagues at the other ports of call.

"The Hotel Savoy-Plaza in New York and the National Hotel in Havana will be official hotels.

"DR. JOHN LAURICELLA has been appointed President of the new Section of Industrial Medicine and Surgery for the Seventh Cruise-Congress."

Dr. Friedman's New Book

Review by
JAMES T. CASE, M.D., F.A.C.S.,
Chicago

TEXTBOOK OF DIAGNOSTIC ROENTGENOLOGY, by LEWIS J. FRIEDMAN, M.D., Director, Roentgen-Ray Department, Bellevue Hospital; Instructor in Radiology, New York University College of Medicine; Chief Radiologist, Stuyvesant Polyclinic; Consulting Roentgenologist, Police Department of the City of New York. Pp. 623; 638 illustrations, mostly roentgenograms. D. Appleton-Century Company, Inc., 35 West 32nd Street, New York.

EVERY teacher of roentgenology is on the lookout for a new and better textbook. In spite of the rather long list of publications in English on the subject of roentgenological diagnostics, each one seems to have its drawbacks. Some are too long, some too short; some scantily illustrated, others with a plethora of poorly reproduced roentgenograms. So the arrival of the present work at the reviewer's desk finds him anxious to see the good points which set this work apart and above its contemporaries.

A favorable impression is once created by the respectable but not too voluminous test, and by the wealth of illustrations (more than one to the page), the majority of which are half-tone reproductions in the negative of excellent original roentgen films. Thus the reader sees the films in the same photographic tone which they bear in the original films which come to his desk in his daily work. It is true that in fluoroscopy the contrary is the case, and one sees the shadows as black, but he will soon become accustomed to the shadow values when seen in the positive or in the negative, and the bulk of any radiologist's work is carried on with film records.

Many texts on roentgen diagnosis fail to include an introductory section on technic. It is apparently taken for granted that the physician who employs the x-ray method must have a practical knowledge of the technical procedures. However, it is our practical experience that such a section is useful, and we are glad to find it in the work before us. A discussion of apparatus, physics pertaining to radiology, fluroscopy and other technical procedures for radiography and dark room processing consumes 66 pages. Further instruction on technical procedures is included in each of the chapters on diagnostics.

The remainder of the book is devoted to a well arranged consideration of the osseous system (217 pages), the respiratory system (84 pages), the cardiovascular system (57 pages), the alimentary tract (108 pages), and the genito-urinary tract (58 pages). The division of the discussion seems well balanced, and on the whole the book is to be highly commended. Our criticisms are of relatively minor importance. The book is one which should find a wide circulation. We recommend it.

Industrial Medicine

Reg. U. S. Pat. Off.

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VOLUME 6 JULY, 1937 NUMBER 7

LeRoy Philip Kuhn

EMBATTLED enemy of Death, the SURGEON intervenes before its reaching claws, stays its black-mantled eagerness to shorten life's alloted span. And so, embattled enemy of Death, the SURGEON becomes the special and peculiar interest of Death. And Death stalks him, and strikes him down—and gloats when finally he lies inert, his warm and understanding heart forever still, his keen mind reft of keenness, his sentient hands so quiet in eternal rest. And gloats again when it can strike ahead of time, to cut him off at mid-day of his strength, and mark untimely period on his skill.

Death has taken LEROY PHILIP KUHN, M.D., F.A.C.S., and *great surgeon* in his own right. Death took him at 58, cut him down in the midst of his usefulness, snatched him out of the high place he made for himself, and the distinction which was so peculiarly his own because his own fine qualities had made it so.

He was our friend, and our co-worker. He was one of the small group who encouraged and aided us in establishing INDUSTRIAL MEDICINE five years ago. And ever since, he has been one of our Editors—and always kindly, patient, sympathetic and helpful. No other interest so pressing as to turn his attention from our need for advice and counsel when we asked him, and—more characteristic of the man—our need for substantial encouragement at times when we needed it but didn't ask. We have a mite of comfort in the fact that we expressed *to* him, and *of* him, *before* he was taken away, some little part of our appreciation of him, not only as he was in *our* small circle, but also as he was, and so richly deserved to be, among his many professional and business associations. It was our privilege to confirm, for those who knew him, and mention to those who didn't, "the charm and friendliness of his manner . . . . 'You are liking him before you know it.'" And to say: "Experiences do various things to the man who undergoes them, but, in the main, either they bear him down or they push him up—either he takes what he wants out of them, or they take what he has out of him. The fact that Dr. Kuhn has taken what he wanted out of the rich and infinitely varied surgical experiences which have come his way is well established—if, by nothing else, by the frequency with which this biographer, inquiring among Dr. Kuhn's professional colleagues on one or another phase of industrial medicine and surgery, encounters the reply:

"Ask Roy Kuhn. He had a case . . ."

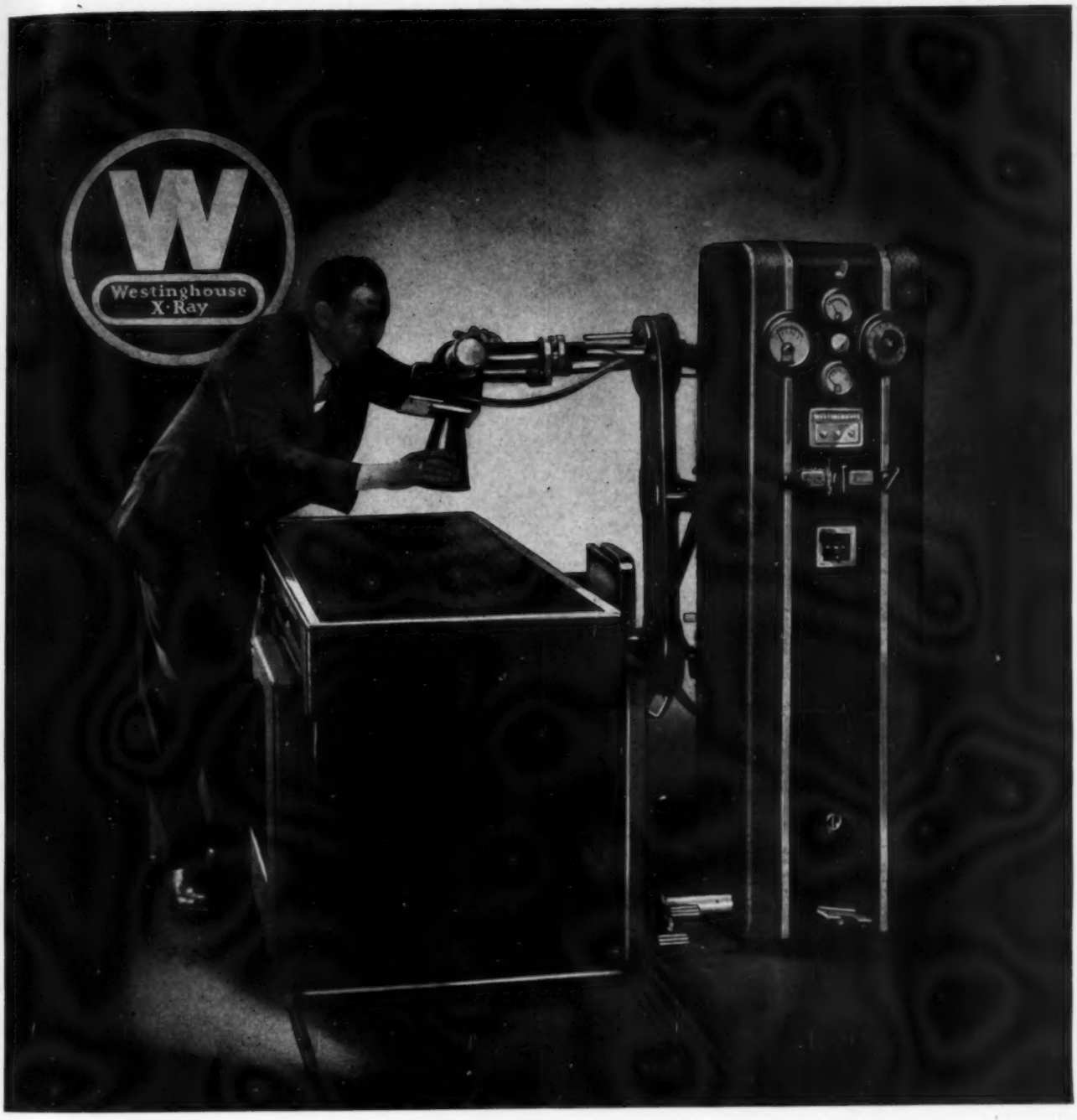
And we said in our WHO'S WHO that he was "Distinguished for bringing to insurance surgery a high standard of traumatic-surgery practice." He was, indeed.

We shall miss him. His telephone call, when a new issue reached his desk, to tell us it was "a dandy—but . . ." His suggestions. His uncompromising attitude on matters wherein we sought his counsel concerning advertising revenue on the one hand, as against ethics on the other—although, and due in no small part to him, we have now, for some time, been irrevocably "Council accepted" in respect of advertising. And his warm and understanding friendliness, evidenced in so many ways. He was our friend, and we shall miss him.

But he has left an abiding, indeed an indelible, impression on his chosen field of endeavor. The field of industrial medicine and surgery owes him much. He was one of its pioneers in point of time, and one of its great men in point of achievement.

"Uncle Sam, M. D."

WE EMPHASIZE here the suggestion on the Contents page to read the article under this heading, on p. 432. Read it, to *think*. And if you possibly can, read also the full text of the Address of James Hamilton Lewis, Senator from Illinois, to the Special Executive Session of the American Medical Association, at Atlantic City, June 10, 1937. The Senator's speech was printed in *J.A.M.A.*, for June 26, 1937. Read it, to think—and to wonder. To wonder where our nation of free people, free individuals, is going: "We," says the Senator, "need his life . . ." referring to *your* patient. Who are "we?" Is it now the *government* which needs the citizen? Our country was founded on the principle that it is the other way round. Our citizens need government — but at present they have vastly too much of it!



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Occupational Diseases and Industrial Surgery

Uncle Sam, M.D.

A PLAN to regiment the practice of medicine in the United States through a system of health insurance is developing in Washington.* It would replace the highest type of medical facilities in the world with government supervised facilities to be paid for out of a fund created by compulsory contributions by worker, employer and state. It would require wage earners to pay insurance premiums for medical services whether they used them or not.

Those most interested in the plan would like to submit their bill at the current session of Congress. The proposal is of momentous interest to every American who needs medical care or may ever need it. It would destroy the present sympathetic relationship between patient and physician, lower the superior standard of medical practice in the United States, and retard its progress.

Furthermore, it would work economic havoc because it is reliably estimated that adequate medical care with the Government in charge would cost 10% of the national pay roll. Piled on top of the ultimate cost of the present Social Security Act, this would mean another sharp increase in the cost of living, possibly beyond the individual's capacity to save.

Compulsory health insurance was not overlooked by the President's Committee on Economic Security upon whose research was based the Social Security Act. The committee said:

"In the United States we have had a long experience with sickness insurance, both on non-profit and commercial bases. Both forms have been inadequate in respect to the protection they provide, and the latter—commercial—has in addition been too expensive for people of small means. Voluntary insurance holds no promise of being much more effective in the near future than in the past."

The committee reported out no health insurance plan. It said more time was required for study. There is every reason to believe that study is about finished and that compulsory health insurance is to be recommended. Its sponsors are grinding out propaganda to influence public opinion in its favor.

Articles and books on compulsory health insurance have been appearing in unprecedented numbers. Nearly all of them suggest it is a good thing. The medical fraternity and the public are yet to be consulted.

American doctors shudder at the possibility that any scheme, or combination of schemes, of compulsory health insurance now in force in Europe shall be imposed upon Americans. They know that, in countries having compulsory health insurance, infant mortality is higher, preventive diseases more prevalent, life expectancy shorter; that the loss to worker and industry from illness is greater, the advancement of medical science slower, and the practice of medicine a hopeless drudgery, unfair to both patient and physician.

*PAUL A. WILLIAMS, in *Nation's Business*, May, 1937.

If there is to be a change here, it must bring improvement with justice for everyone. It must, above all, benefit the patient, not the politician. This is the firm belief of the doctors and they are preparing to fight for it. Organized medicine, represented by the American Medical Association, has already taken the field.

How will it work?

WITH opposing forces lining up for battle, let us look into compulsory health insurance. What is it? How does it work? Who wants it? Who pays for it? Who needs it? For the answers to these questions we must turn to Europe, for that is where they have it.

Those who have stood hot and hungry in a crowded restaurant waiting for a table; those who have swamped the office of an employer who has advertised a job; those who have inched along in line to the entrance of a theater showing a feature film; all have some idea of the situation they will face when, having dutifully paid their premiums under compulsory health insurance, they call at the office of a contract doctor.

Doctors, although not many of the successful ones, will contract to treat from 1,000 to 2,500 patients each. Experience will teach patients to appear early at the doctor's office to get a good place up front. The reception room will be stuffy with the presence of assorted patients in various conditions of health, and some of them may have to stand in the hall. The doctor will be there early, too, so that he will have more time for profitable private practice.

His harassed assistant unlocks the bulging files containing copies of the official records of cases, and copies of those voluminous reports every contract doctor is required to make to autocratic bureaus. She then takes a deep breath and opens the door connecting with the reception room. The doctor glances hastily at the line of expectant faces for a sign of critical illness. Finding none, he beckons the fortunate person nearest the door.

He may ask in two or three at a time. Progress through his medical mill will be just as rapid as he can make it, because he knows more will come later, or that a private patient who will pay him a regular fee and receive immediate attention, may appear any time.

If the case is not "within the competence of a general practitioner," (England) the patient will be sent to a doctor qualified to give proper treatment and advice. The patient will go where he now goes in the first place, and will pay for this special treatment just as he pays for it now.

Appeal to prove sickness

SOME may be told that nothing is the matter with them and ordered back to work. They have the right of appeal. If they can bring some influence to bear, they may, on a second examination by another doctor, be marked sick and thereby become eligible for cash benefits, a part of the insurance scheme. Others will be certified as unfit for work and will also receive small weekly payments.

Some will receive prescriptions that can be filled at contract drug stores. The cost of these averaged 16 cents (England) in 1934. The well-to-do continue to see doctors engaged exclusively in private practice. Dependents of insured persons (England) continue to pay for medical attention. Those so poor they cannot pay anything will receive free medical care just as they receive it now.

Compulsory health insurance has been dressed alluringly, but, to the American doctor who has studied it, it is a sordid, slipshod, dangerous and inhuman tinkering wtih health.

Proposed legislation forcing American doctors into the wholesale practice of medicine is certain to pattern after compulsory health insurance laws in Europe with, of course, some original angles. Let us, therefore, examine briefly what they have across the Atlantic. Bismarck introduced the system in Germany in 1883 as a sop to socialism. It encouraged rather than retarded socialism. The scheme in Great Britain became effective in 1912. In both countries the plan is limited to low wage earners and covers 31.4% of all Germans, 39% of the workingmen and women in Great Britain.

The law in England is limited to manual laborers more than 16 and white collar workers earning not more than $1,250 a year. The cost is 18 cents a week for men and 17 cents for women. Of this, the employer contributes nine cents regardless of the sex of the worker. To the total, the Government adds approximately one-seventh.

The charge against the fund for medical benefits is limited to six cents a week for every insured person. The balance of the money paid goes in for benefits — sickness, disablement and maternity—and the cost of administration. Furthermore, health insurance is interlocked with widows' and orphans' insurance.

The health section is administered through Insurance Committees organized in every county and county borough by the insured, doctors and authorities. Each committee prepares a panel of doctors who wish to treat insured persons.

Any doctor may have his name on a panel (most of the good ones stick to private practice) and any insured person may select any panel doctor. A dissatisfied patient may change his doctor after a month's notice. A doctor can get rid of a disagreeable patient on 14 days' notice. Every panel doctor agrees to supply every person on his list with all medical treatment (within the competence of a general practitioner) and prescribe as necessary within the appropriation for medicines. For each person on his list a doctor receives $2.25 a year.

The British Ministry of Health's report shows that, in 1934, there were 15,521,000 persons on the panels of 15,500 physicians. Average income for the doctors was $2,252, less an emergency deduction of seven and a half per cent, living $2,083. After paying income tax of 25%, the doctor had $1,562 left with which to pay living

OCCUPATIONAL DISEASES

The General Assembly of the State of Illinois has recently passed an Act, covering occupational diseases of Industrial employees. This Act is particularly concerned with diseases of the lungs, and poisoning from certain chemicals.

Under this new law it will be necessary for many industries to examine their present employees, and new employees, to determine their present health status and thereby prevent future liability.

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All members of our Professional Staff are approved by the American Medical Association.

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expenses and hire his office help.

While the average number of patients was 1,001, about one-third of the doctors in London had from 1,250 to 2,500. Even then economic circumstances forced panel doctors to continue private practice.

Panel doctors look at from 30 to 60 patients a day. They go by him rapidly, almost mechanically. It is a tiresome and tiring business. Snap judgment is common, errors numerous.

Whether they are sick or not, patients bring in numerous forms for other insurance funds wihch some doctor must sign. They ask him for iodine, aspirin, lozenges and bandages for future use around the house. Some have a liking for a particular tonic and demand it repeatedly. Often enough a wife comes in asking for "something for 'Enry's cough." Knowing "'Enry," the harried doctor frequently gives it to her although he is supposed to see the patient. Malt and "Russian oil" are favorites of panel patients, since they may be traded elsewhere for something more desirable. The situation has caused Sir Kingsley Wood, Minister of Health, to tell the House of Commons "we are rapidly becoming a nation of medicine drinkers."

Doctors do double duty

IN SOME areas in London panel doctors hang in their offices signs reading, "Please do not spit on the floor." Some panel doctors have separate waiting rooms for panel and private patients. Others have one office for panel patients and, miles away in a tonier neighborhood, a second office for private practice. There are instances of doctors with two offices for panel patients, serving them at different hours.

The doctor knows that some who saw him as a panel doctor will be back to talk over their cases for a fee, as private patients to private physician, with the comforting thought that an inquiring regional medical officer or an insurance commissioner cannot read their records. It is not astonishing, therefore, to learn that more than 50% of those treated at free clinics in London hospitals are insured persons; that in many instances their cases had not been diagnosed by panel doctors. Nor that 600,000 Britishers compelled to pay premiums for health insurance thought so little of panel practice they did not register with Insurance Committees, thus scorning the medical service for which they had been taxed.

Speakers for organizations of the insured have complained that too few good doctors enter panel practice, that the better ones in it resign because it holds them back professionally. These speakers have repeatedly expressed their doubt panel doctors are keeping up with medical science. To remedy these short-comings, the insurance fund appropriated $40,000 for scientific betterment in 1934. Of this, only $11,770 was spent. It went for short courses of post-graduate study. Divided among 86 panel doctors, there was an average of $137 for each one!

In addition to medical treatment, the compulsory health insurance act in England provides sickness benefits up to $3.75 a week, disablement benefits to $1.85 weekly, and maternity benefits in a lump sum of $10 or $20, depending on whether the woman or her husband is insured. These benefits are administered by hundreds of Approved Societies with some 5,000 branches. These self - governing groups are usually formed by persons already associated in political, fraternal, labor and religious organizations.

There is, then, a double reason why politicians should listen to them. This may explain why, in 1932, at the request of the societies, regional medical officers certified 621,689 persons unfit to work and put them on weekly benefit rolls.

These 621,689 had only a short time before been declared well.

Political influence of Approved Socities is one of the reasons there was no fulfillment of the hope that, under compulsory health insurance, the panel doctors would detect disease in its early stages and thereby reduce the tremendous financial loss to workers and industry from illness. Actually, the loss has grown enormously. An official survey of the insured population of England revealed that, in 1933, the loss through sickness was 12½ days per worker, as against nine days before health insurance. The record in Germany, where compulsory health insurance has been in force longer, is much worse. In 50 years of the system there the annual loss from sickness has increased from five and a half days to 28 days. In the United States, the loss has remained the same, six and a half days, for 25 years.

Patients seek sick benefits

NO ONE claims that sickness in England and Germay increased to the extent these figures might indicate. What actually happened was that lazy workers managed to get themselves on benefit rolls. There are statistics to prove the volume of malingering. Of 2,008 Germans ordered to final examination to determine whether they were fit for work, 816 immediately decided they had recovered, 289 others were found to be well. The same situation is found in England. On the re-examination of 468,000 persons in 1934, 179,000 were declared sick, 289,000 were found to be well!

Social workers also claim compulsory health insurance is a great stride in preventive medicine. The claim is unsupported by facts. After analyzing reported diphtheria cases for 10 years ending in 1933, the League of Nations concluded:

"The number of cases increased in Germany and Austria, where the insurance system extends to the family, and also in England and Wales, where families are not included. The number of cases has declined most rapidly in Canada and the United States where there is no compulsory sickness insurance."

(In 1936 the province of British Columbia adopted compulsory health insurance providing only for medical care, excluding benefits.)

A year later the League reported the death rate from tuberculosis was also higher in countries with compulsory health insurance.

Figures for infant mortality, which the medical world regards as a highly sensitive index of general health, also are unfavorable to those nations with compulsory health insurance. For 52 German cities the rate was 60; for 121 English cities, 63. Compare these rates with Boston, 57; New York, 52; Cleveland, 44; Chicago, 48; Los Angeles, 53; Toronto, 48.

Sickness rate is higher

IN EUROPE they seem to be getting sick more often and staying sick longer. Happily, the situation in the United States is just the opposite. As recently as 1910, the average time a patient remained in an American hospital was 20 days. Today it is just half that. For Americans also two years have been added to life expectation, at birth, since 1929.

Europeans frankly envy our progress in preventive medicine. Edwin T. Nash, British public health official, offers one explanation for this advance in the *Journal of State Medicine*:

"America has been some 10 years ahead of us in this matter, due to a certain extent to the American flair for wholesale publicity, together with a more polyglot population in its big towns that is more susceptible to flamboyant methods of propaganda than our more sober-minded and less emotional people."

It is just possible that the absence of mass practice has had something to do with the manner in which American medicine has been going places.

American Government workers were in England late in 1936 studying compulsory health insurance. Will they report that only half the work done by panel dentists was judged "satisfactory" in 1934? Will they tell us the cost of administering the act was half the total sum received by panel doctors? Will they overlook the fact the London County Council, under the poor law, still maintains hospitals and institutions with 42,000 beds for the sick poor?

They will tell you, certainly, that 45% of British doctors are in panel practice and that a vast majority of them are for compulsory health insurance. They will tell you, also, the British Medical Association favors it. They favor it because the unattractive conditions today are better than they were before, when people of small incomes prepared for sickness expense by joining Friendly Societies.

A suggestion for state medicine

COMPULSORY health insurance is no stranger in our state legislatures. Some 25 of them have considered a bill sponsored by the American Association for Social Security. It takes a whopping big slice off the pay roll, saddles more taxation upon worried states. One important reason the bill has not been adopted probably is that politicians sometimes become ill and when they do, they take their illnesses seriously.

But the measure has been studied in Washington by those interested in putting over compulsory health insurance on a national scale and we may well take a look at it.

Annual compulsory contributions are graduated according to the pay of the worker. Here they are:

Worker	$10.40 to $93.60
Employer	33.80 to 46.80
State	15.60 to 46.80

Three - fourths of the fund is for

medical care. The remaining fourth is for cash payments up to $19.50 a week for family heads who are sick and unable to work.

The bill sets up in each state a State Health Insurance Board of five, a State Advisory Council of 12, and a State Medical Advisory Council of nine.

A state is divided into districts, each with a full time medical supervisor and a finance officer. A district is sub-divided into local areas, each with two permanent employees, a council of four appointed members receiving a *per diem* and expenses, and as many local advisory committees as are necessary, with expenses paid.

Under this bill, the state will begin taking an interest in your child before it is born. An expectant mother will receive benefits six weeks before and after the birth of her child "providing she is receiving pre-natal care prescribed by the board!" Care for others "shall include, under such regulations as the board may prescribe, immunization and periodic physical examinations."

If the state thinks your teeth need fixing they will be fixed to the extent "necessary to correct conditions which the board finds are seriously prejudicial to health, or are causing or threatening to cause disability, or are interfering or threatening to interefere with the pursuit of gainful occupation." Appliances and glass eyes will be distributed. And there are additional benefits which the board may provide without charge.

The board can make donations to medical institutions, create new medical facilities, "take such steps as it may deem feasible and appropriate to reduce and prevent sickness, injury and death"

Finally, "It shall have full investigatory powers and shall have direct access to the sources of all information!"

This is a plan for as complete and autocratic a bureaucracy as ever fastened itself on a docile democracy. It is offered in the guise of compulsory health insurance, for which there seems to be no popular demand. There is a movement to create an artificial demand. With all of this the doctor has no sympathy because he knows the two outstanding causes of sickness are poor housing and malnutrition, social problems big enough to engage all the energies of all the social workers for the rest of their lives.

Few lack medical care

IS THERE a need in the United States for compulsory health insurance? Most authoritative information on the question was gathered by the Committee on the Costs of Medical Care, and it was gathered by social workers. They concluded that 90.2% of American sick receive competent medical care. We are, then, concerned with the remaining 9.8%.

We do not know where they live except that unknown thousands of them are in backward states. If they live in cities they can receive excellent medical attention at hundreds of free clinics. If they do not seek these services now they cannot be compelled by law to seek them.

It is a fact that low income groups in the United States receive medical care superior to that obtainable by those in the same category living in countries which have compulsory health insurance. They pay for it, if they pay at all, according to their means. For their money they get a quality of service not to be found anywhere else in the world. It is also a fact that, although they were hit terrifically by the depression, doctors and hospitals gave, and continue to give more free services than any other class.

Physicians, alone, provide the sick poor with services valued at $750,000 a day!

They are not boasting about it, they are not squawking about it. But they are becoming vocal about the propaganda for legislation designed to place the sick, and the treatment of the sick, under political control. They have some ideas of their own about what should be done. Only a few months ago the trustees of the American Medical Association made the following offer:

"Referring to a group of the population neither wholly indigent nor fully competent financially, but under some circumstances unable to meet the costs of the usual medical procedures: The board points out the willingness of the profession today to do its utmost to provide adequate medical service for all of those unable to pay either in whole or in part. Members of the medical profession, locally and in the various states, are ready and willing to consider other ways and means for meeting the problems of providing medical service, and diagnostic laboratory facilities for all requiring such service, and not able to meet the full cost thereof. These are financial and administra-

THE BULLETIN

of

The American Association of Industrial Physicians and Surgeons

THE object of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for the mutual advancement in the practice of their profession.

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tive problems of local rather than federal responsibility.

"Willingness to meet the situation does not constitute in any sense of the word an endorsement of health insurance, either voluntary or compulsory, as a means of meeting the situation."

This statement of principles by organzed medicine admitted that conditions are not altogether satisfactory, but expressed a willingness to cooperate in finding a remedy. Before the month ended there was action.

In assuming the presidency of the Medical Society of the County of New York, Dr. Adolph G. DeSanctis proposed the establishment of a medical service bureau to determine patients' capacity to pay. The bureau would arrange for minimum fees comparable to fees fixed by the Workmen's Compensation Bureau. Reductions would amount to from 50 to 75% of normal fees.

The doctors' opinion

ALSO before the end of January, Dr. Charles Gordon Heyd, president of the American Medical Association, expressed in more detail some of the ideas of organized medicine for the improvement of conditions. They were:

"Facilities for post graduate instruction must be enlarged greatly, coordinated and amplified. There must be courses for periodic reeducation of the doctor, keeping him abreast of medical discoveries.

"A diagnostic laboratory service in chemistry, bacteriology and pathology should be established exclusively for practitioners and without cost to them.

"All features of medical service in any method of medical practice should be under the control of the medical profession. No other body or individual is legally or educationally qualified to exercise such control.

"No third party should be permitted to come between the patient and his physician in any medical relation.

"Patients must have absolute freedom to choose a doctor.

"In whatever way the cost of medical service may be distributed, it should be paid for by the patient in accordance with his means and in a manner that is mutually satisfactory.

"Medical service must have no connection with any indemnity cash benefits.

"The insurance principle as applied to human sickness is acceptable only in buying hospital lodging and accommodations, food and general nursing care.

"There should be a census of indigents and they should be certified by central bureaus under the Department of Welfare, with proper representation from the county medical society.

"The free out-patient departments of hospitals should be completely separated financially from the pay services.

"The number of patients that may attend any one clinic should be limited."

Dr. Heyd also asserted his unequivocal opposition to all forms of compulsory health insurance. He said:

"These schemes tend to relieve the individual of his own responsibility and to increase the length of illness. In short, it is profitable for the individual to be sick. The outstanding defect is that it divides the practice of medicine into a class practice, and the measure of effectiveness of the medical service depends on the economic status of the patient. A superior type of service is created for the well-to-do. The practice of medicine in the lower economic groups becomes largely a prescription practice —a brief consultation, a scant history, a bottle of medicine."

We come now to the cost of compulsory health insurance in dollars. The employee will surrender a sizable percentage of his wages, the employer's share will be even larger. States, already bending under the burden of debt, will donate from 25 to 30% of the total, receiving a partial kickback from the federal Government. But there will be more to it than that.

A paternal government providing an existence for those on relief will

The Association for the Advancement of Industrial Medicine and Surgery

Inc.

Executive Office - 370 Lexington Avenue, N. Y. (Room 904)

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DUST IN INDUSTRY — What the hazards are; how to determine their existence; how to combat them.

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be called upon to take care of their health insurance premiums.

Hospitals and doctors will expect from states regular payments for those service now given to the sick poor.

And may not philanthropists who have built such a large number of our 7,000 hospitals with their 892,000 beds come to regard such endowment as also a responsibility of the states?

It is certain the states will be asked to make up any deficits in insurance funds.

Finally, the United States has more doctors per 100,000 population than in any other nation. And they are here in that comforting combination of quality with quantity. Proud of their ranking position in their science, and determined to maintain it, our doctors are virtually one in opposing a compulsory health insurance plan.

Who will not agree with them there is no place in American medicine for boondoggling?

A Program for Industrial Hygiene

THE Industrial Commissioner is charged by the Labor Law with the maintenance of healthful working conditions in industry in the State of New York and with the safety of the worker.*

To this end the New York State Department of Labor is attempting to provide the worker with a working environment which will not be detrimental to his health from the viewpoint both of accident and disease.

In the State of New York at the present time there are approximately 45 to 50 thousand factories of various kinds employing more than 1,900,000 workers.

The magnitude of the accident problem may be appreciated when one realizes that in the year 1936 there were in the State of New York 457,516 reported accidents. The compensation cost for these industrial accidents during the year 1936 was in round numbers $26,000,000.

Each year there are approximately 1,500 cases of occupational disease at an annual cost of approximately $500,000. This number is now on the increase since the occupational disease law is now all-inclusive.

If it were possible to design all industrial plants from the point of view of health and accident protection as well as production, then our problem would be greatly simplified. In the past the accent has been on production practically entirely and when we attempt to effect changes in such plants in order to protect against health and accident hazards, we find that we are faced with a rather difficult problem. On the other hand, these problems are relatively simple when the factory is designed with them well in mind.

In addition, the development of new machinery and new methods has tended to increase accident hazards only when the viewpoint of health and accident protection is not borne in mind. Similarly, in the chemical field the development of many new chemical substances has tended to introduce new poison hazards into American industry.

Our problem, then, consists in a large backlog of old accident and health hazards and in addition, increments of new accident and health hazards due to the use of new machinery and new substances. Lead poisoning still remains an old industrial hazard which is increased by the addition of new lead compounds such as lead tetraethyl. Benzol is a relatively old industrial hazard as is methyl alcohol. The hazard associated with both of these is increased by the use of the spray gun.

Industrial hygiene efforts are now being conducted in about 20 States of the Union. In all but three States, New York, New Jersey, and Massachusetts, industrial hygiene work is an integral part of the State Department of Health. In Massachusetts, New Jersey and in New York, industrial hygiene is a part of the State Department of Labor. This has an important bearing on the nature of the work conducted by the Department and close study of the subject will reveal the fact that in no Department of Health is any routine factory inspection carried on at the present time so that only in the States of Massachusetts, New Jersey and New York is it possible to have a close tie-up between inspection and industrial hygiene.

In most States, in fact, practically all we find is that industrial hygiene consists in the making of certain studies and in the issuing of suggestions or recommendations but not in the presentation of orders for actual changes in plant arrangement or

* LEONARD GREENBURG, M.D., Executive Director, Division of Industrial Hygiene, New York State Department of Labor, in *Industrial Bulletin*.

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operation. In fact, in very few States are the efforts of the Division of Industrial Hygiene carried over to the inspection staff of the Department of Labor and there put into the formulation of orders for the control of conditions.

Research studies of various kinds are conducted by the United States Public Health Service and the insurance companies and the United States Bureau of Mines and some universities. All of this work, either laboratory or plant research, has for its object the ascertainment of facts which are of significance from the industrial health point of view. But, this clearly and completely omits that part of the program which consists in the putting into force and effect the recommendations and findings of the research studies.

Our problem consists, essentially and briefly, in the introduction into industry of safe practices from the point of view of accidents and health hazards on a complete and broad scale.

This does not mean that we must only know a great deal about lead poisoning, for example, but rather that in every plant employing lead we have, on the basis of our knowledge and experience, instituted such measures as will prevent the occurrence of lead poisoning.

It is quite apparent that the Division of Industrial Hygiene must be in possession of knowledge concerning all of the health hazards in existence at any given time.

We know all of the health hazards which have been recognized and described in the literature and we must keep abreast of the new literature and new substances in order to be cognizant and familiar with the newer health hazards as they arise.

It may be, and sometimes happens, that new materials or, in fact, old materials are used in industry and by various means and methods we may become suspicious of their toxicity, and at this point we must conduct investigations in order to determine the effects of these substances.

Granted that we know reasonably well all of the older health hazards and the newer ones as they arise, and that we may study and learn of the effects of new substances, we are now presented with the problem of how to remove or overcome these hazards. Learning how to remove or overcome health hazards may require little or no study or, on the other hand, may require extensive plant and laboratory investigation both chemical, medical, engineering, etc., before the results may be achieved. It may be necessary to conduct studies on the toxicology of materials along with ventilation studies on its removal both in the plant and in the laboratory

Granted that we now know sufficient about a hazard and its qualities and further, that we are well versed in the technique of removing or overcoming the hazard, our problem now consists on delivering this information back to industry and the worker and putting it into effect. We must have some technique for delivering this information back into the hands of the plant owner in every case wherein such a hazard exists. This step in the program may involve personal contact with the plant manage-

The Industrial Doctor

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ment or may, on the other hand, involve the use of printed material or, in some cases, may involve a combination of both methods of approach.

But informing industry does not by any means guarantee the effective installation of the measures necessary for the control of a health hazard. It becomes essential to possess a technique which makes certain that industry takes adequate steps to control the hazard. Should this not be done voluntarily, it may be necessary and desirable to employ some means of compulsion. This is accomplished by reasonable codes and regulations.

Finally, in order that our efforts may not at any time weaken, in order that the industrialist and the factory manager may not at any time relax their efforts, it becomes absolutely imperative that a continuous program of education be set up and conducted with this end in view.

The above steps outline briefly the course of events from the beginning of our knowledge of a hazard to its continuous control in industry. Let us briefly examine each step in the program as outlined previously.

There are several ways in which we may learn of the existence of new industrial hazards. The scientific literature and the literature of other States may report hazards and then we may investigate plants in the State of New York in order to determine if the same hazards exist in plants under our jurisdiction.

Similarly, a wide knowledge of the general hazards of industry may lead us to certain fundamental studies and inquiries in our own geographical area. These are the two classical lines of endeavor usually followed by Divisions of Industrial Hygiene. That they may lead to failure is obvious from experiences in many States of the Union. The problem is very analogous to that of the State Health Department in the control of infectious diseases. The State Health Department usually relies on physicians' reports of infectious diseases which, after analysis by the epidemiologist, may become a signal of the undue incidence of any particular disease. In a similar fashion certain Divisions of Industrial Hygiene have been relying on the reports of physicians. These are of some value but, unfortunately, many occupational diseases are unrecognized by the private practitioner and, moreover, reporting in this field is by no means complete; in fact, far more incomplete than are reports of infectious diseases, and the latter are in many cases themselves notoriously incomplete.

In the State of New York we do not rely on physicians' reports of occupational diseases completely. But, in addition to all of the above mentioned approaches to the problem, we place great reliance on applications for compensation made by workers who claim injury or disease due to their employment. Undoubtedly, some cases of occupational disease may be missed by this approach and, certainly, in some cases claims which are not valid are made. In other words, these applications for compensation may represent an overstatement of the problem but at least they give us full access to practically all of the cases which arise in industry.

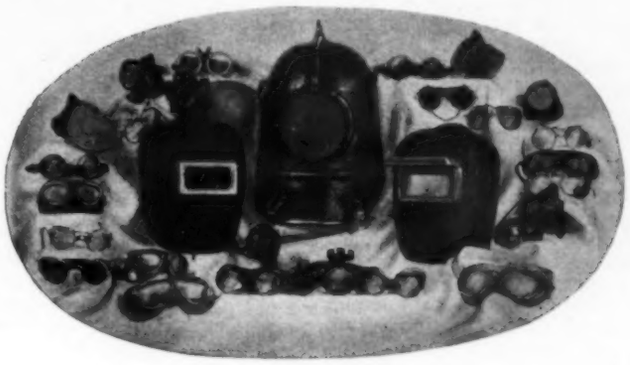
In addition to the reports of occupational diseases and accidents, our general knowledge of the whole field has served to acquaint us with the outstanding basic problems which constantly require unrelenting effort for their solution.

The determination of the effects of industrial hazards is a direct result of surveys and studies. This constitutes an important part of the work of the Division of Industrial Hygiene and, as will be seen later, at the moment we have several such important studies in progress.

These studies make use of the joint efforts of the physician, engineer, chemist, safety expert and investigator and once this coordinated group has an opportunity to undertake the study of a hazard, the next step becomes relatively simple.

The recommendations emerging from research studies and surveys lead at once into the field of prevention and follow as a natural result from such studies.

The means and methods which industry employs for the control of hazards may be carefully viewed by members of the Department in order to make certain that such means will effectually attain the desired end. In the Division of Industrial Hygiene we have a section composed of six engineers whose duty it is to examine plans for exhaust systems which are to be installed in industry Last year approximately 1500 sets of such plans were passed upon and given approval by the Division. It is fair to say that in practically all of these cases industry, under this guidance, is employing ventilation techniques which



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are certain to yield the desired result.

Legal compulsion for health protection is a technique which is used throughout the United States both within and without industry. In fact, every State and City Department of Health possesses certain code rules and regulations for health protection which from time to time are altered as new and important developments occur in the field of medicine and public health.

Most people employ health protective measures without recourse to legal means but it is true that in some cases such legal force is necessary.

In the Department of Labor each factory is inspected at least once a year by the Division of Inspection and must maintain itself within the requirements of the various Codes pertaining to conditions and processes therein.

These Industrial Codes are nothing more than reasonable safe practice techniques for use in industry. They are compiled by the Division of Codes, with the professional advice of the Division of Industrial Hygiene and enforced by the Division of Inspection.

The Division of Industrial Hygiene is now engaged in the study and preparation of reports on the following subjects:

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One may ask what the Department expects of the industrial company. This is a very reasonable and logical question and may be answered in a most direct manner. "We ask industry to put into force those engineering techniques of proven value in order to prevent disease and injury to the industrial worker. And we further ask industry to attempt to ascertain prior to use, the degree of toxicity of every new material which is introduced for factory use."

It requires the voluntary cooperation of the industrialist and the worker as well as the constant efforts on the part of the Division of Industrial Hygiene to prevent disease and accident in industry.

The benefits resulting from the widespread adoption of such cooperative means will not alone result in great benefit to the human element involved in the factory but simultaneously will result in decreased insurance costs and likewise in decreased costs of production.

Summary Reports on Silicosis

THE Division of Labor Standards of the United States Department of Labor in *Bulletin No. 13*, last month issued a summary of reports submitted to Secretary of Labor Frances Perkins by Committees of the National Silicosis Conference on February 3, 1937. The reporting Committees were:

1. On Prevention of Silicosis Through Medical Control.
2. On Prevention of Silicosis Through Engineering Control.

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3. On the Economic, Legal and Insurance Phases of the Silicosis Problem.

4. On the Regulatory and Administrative Phase of the Silicosis Problem.

Full Committee reports with appendixes will probably be published at a later date, according to the present *Bulletin*.

"In issuing these summary reports," the preface to *Bulletin No. 13* says, "the Department of Labor is acting merely as a disseminating agency. The conclusions and recommendations contained in the Committee reports do not necessarily reflect the views or policies of the Department of Labor."

The Injection Treatment of Hernia

A HUNDRED years ago hernia was regarded an incurable affliction, as indeed it was by any method known at the time.* Seventy years previously, in 1665, Nicholas Dequin had invented the steel spring truss and this was all the surgeon had to offer the sufferer from hernia. In 1832, Dr. George Heaton hit upon the idea of injecting an astringent solution into the inguinal canal and after experimenting for seven years perfected a solution and a technique for the cure of rupture. For 50 years he plied his craft with such success that he was able to gain fame and fortune. Beginning in Chicago, where he found the atmosphere not congenial he migrated to Boston, where he invited the representatives of the medical profession to witness his operation. This they refused to do, and he became a martyr, gratuitously advertised the world over. He made a triumphal tour through England and returned to America and Boston a famous man, who had cured hernia when the famous surgeons could not.

Recognizing the success of Heaton's operation, the American Medical Association appointed a committee to wait on him and learn his secret. This Heaton now refused to allow, and the committee reported that there was no surgical operation to be relied on for the cure of reducible hernia.

In 1870, Heaton published his method in a book entitled "The Cure of Rupture," but the method was so simple that it was laughed at by the profession. J. H. Warren, famous Boston surgeon, of a famous Boston family, became interested in the method and used it, publishing in 1880 his Treatise on Hernia, dealing with the injection method. These injections were painful at times and with the work of Marcy in 1881, MacEwen in 1886, and of Bassini and Halstead in 1889, the radical operation became so firmly established that the injection treatment was forgotten for a time.

In 1900, Dr. Ignatz Mayer of Detroit began the injection treatment of reducible hernia claiming 98% cures of all cases treated. For three decades the injection treatment remained in disrepute, disregarded by the medical profession as a whole, but kept alive by individuals on the fringe of the profession, who continued to

*ROY H. WHITMAN, M.D., Lincoln, Nebraska; presented before the Lancaster County Medical Society, February 2, 1937; published in *Nebraska State M. J.*, July, 1937.

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practice the art, undoubtedly with considerable success.

Then came in the last decade great success in the treatment of varicose veins by the injection of sclerosing solutions. Seeing this the medical profession was in a receptive frame of mind for the re-introduction of the injection method in the treatment of hernia. To Dr. A. F. Bratrud, of Minneapolis, belongs the credit for approaching the problem with an open mind and starting a wave of scientific investigation of its possibilities. To him came a patient with hernia requesting injection, which he agreed to do if he could obtain a suitable solution. He obtained his solution after paying a physician in Chicago for a course in the technique, and treated his patient with success. Becoming interested in the subject he established a hernia clinic at the University hospital in Minneapolis, which was soon so busy and so successful that cases of hernia practically disappeared from the hospital wards.

Two years ago, in the summer of 1934, I visited Dr. Bratrud's clinic and observed his method. I was impressed by the fairness of his approach, by the large number of cases coming for treatment, many of whom would have been poor subjects for operation, and by the satisfaction of these patients. Since then I have been using the injection treatment in selected cases, with some success and enthusiasm.

During the last two or three years interest in this method has grown rapidly; many articles on the subject have appeared in the medical journals, and many surgeons have tried the method. Drug manufacturers have seen the possibilities and a number of different solutions are on the market for the purpose.

SUPPLEMENTARY INFORMATION

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Anatomy

EVERY surgeon who operates on hernia is familiar with the details of the anatomy of the inguinal region which are necessary for an understanding of the injection method. The bony landmarks are the anterior superior spine of the ileum and the spine of the pubis which form the outer and inner attachments of the inguinal or Poupart's ligament. The inguinal region above this ligament is involved in inguinal hernia.

Beneath the skin, and superficial fascia one finds the aponeurosis of the external oblique, whose fibers run parallel to the inguinal ligament and on their lower borders fold over to form that ligament. At a point about one cm. above and one cm. lateral to the spine of the pubis the fibers of the external oblique separate and arch to form the external inguinal ring through which the spermatic cord emerges to enter the scrotum.

Beneath the external oblique fascia lies the muscular internal oblique whose fibers run almost transversally in this region and on its lower border unite with the transversalis in a free edge called the conjoined tendon. In some instances this conjoined tendon attaches at the spine of the pubis, in others to the border of the rectus fascia at a point above the pubic spine. In the latter case a triangular space called Hesselbach's triangle is left between the conjoined tendon and the inguinal (Poupart's) ligament unprotected by the inner layers of muscle and it is through this defect that a direct inguinal hernia is formed.

At a point one cm. above the midpoint of the inguinal ligament the fibers of the internal oblique and transversalis separate to form the internal inguinal ring. The inguinal canal then is the space through which the spermatic cord runs from the internal to the external rings, a distance of about four cm. Crossing the inguinal canal posteriorly and running medialward and upward is the deep epigastric artery. Since this divides the internal ring (through which an indirect hernia arises) from Hesselbach's triangle (through which a direct hernia arises) it is a useful guide to the surgeon in determining whether a given hernia is direct or indirect.

Mechanism

INDIRECT Hernia: In foetal life the testis which formed in the post-pritoneal space descends through the inguinal canal carrying with it the blood vessels which nourish it, the vas deferens through which it empties its sperms, bands of muscle (Cremaster) from the internal oblique and a prolongation of peritoneum, a sac which if it persists, forms the sac of an indirect inguinal hernia. The lower end persists as the tunica vaginalis testis, and ordinarily the upper portion is obliterated. Probably every case of indirect hernia is founded on a failure of obliteration of this sac, but it is often so short and so small in caliber that it does not form a true hernia for many years.

Under the stress of intra-abdominal pressure the sac is eventually enlarged enough to admit omentum or bowel, and once started, the persistent force serves to enlarge the sac and elongate it so that it will migrate into the canal, through the external ring and into the scrotum. One of the reasons it can migrate through the inguinal canal so readily is that whenever the muscles of the abdominal wall are tightened, increasing the intra-abdominal pressure, the internal oblique and transversalis act efficiently, while the external oblique is at a disadvantage being more tendonous in nature. Thus the inner group tends to pull away from the outer, with a resulting actual enlargement of the space of the inguinal canal. This invites the enlargement of the sac in the inguinal canal.

Protrusion through the external ring occurs when the canal is filled by the hernia sac. This type of hernia is more common and more liable to strangulation than the direct hernia because of its narrow neck.

2. Direct Inguinal Hernia: A direct inguinal hernia begins as a saucer-like protrusion of the peritoneum through the weak muscular wall below the conjoined tendon and medial to the cord. Its production is definitely favored by a high attachment of the conjoined tendon leaving a large defect in Hesselbach's triangle. It is covered only by the fascia of the external oblique and as soon as it is large enough it tends to find its way through the external inguinal ring.

It is favored also by the mechanism of muscle contraction which tends to

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increase intra-abdominal pressure and at the same time enlarge the inguinal canal. It is not ordinarily liable to strangulation since the neck of the sac is large, but it may form diverticula in its wall with narrow necks and these may provide points of strangulation.

3. Mechanism of the Truss: It has been long recognized that the spring steel truss will hold an inguinal hernia from protrusion. In fact, a man with a hernia tends to truss himself with his hand on coughing or sneezing.

How does the truss serve its purpose? By providing a constant firm pressure over the inguinal canal from the outside the space in the sac tends to remain obliterated and not permit the filling with omentum or bowel. Also, and probably more important, the space in the inguinal canal between the muscle layers is obliterated because the outer layer is kept in firm contact with the inner layers. Thus when the muscles contract the internal oblique cannot draw away from the external oblique and invite the hernia into the space.

Rationale of Injection

THE injection treatment consists in the injection of an irritating substance beneath the external oblique and all along the inguinal canal. It is not successful unless a properly fitting truss is worn throughout the course of treatments. The substance is not injected into the hernia sac and the sac itself is not actually obliterated. Then what does happen?

The scar contracts both internal and external rings; the fascia of the external oblique becomes densely adherent to the surface of the internal oblique and to a less extent to the cord itself, enclosing the cord in a more rigid inguinal canal. Thus the inguinal canal cannot become enlarged and invite protrusion of the hernia when the abdominal muscles contract.

TECNIQUE: 1. Truss: The first step in the injection treatment is the application of a properly fitting truss. All operators who have had experience with the method agree on the importance of this step, for if the truss does not hold the hernia completely reduced at all times and in every posture, the method is doomed to failure. Some experience in truss fitting is necessary before one can do it properly, or before one can be sure that the truss is properly fitted. The pad should remain in place by the action of the spring and not by the force of any supporting straps. It should produce a definite depression in the skin where it lies. It should exert its direct inward and upward force whether the subject is standing, sitting, or reclining. It should be comfortable.

Once the injections have been started, the truss should be worn night and day until at least a month following the last injection. I have found a truss called the American Silver Truss fills the requirements better than any other I have seen.

2. Solutions: I have used four solutions, Proliferol, Neo-plasmoid, Sylasol, and Thuja mixture.

At present I am using the latter two. Sylasol is made from the fatty acids of Psyllium seed. Thuja mixture is made from Tincture of Thuja and phenol. All the solutions are irritants which cause proliferation of scar tissue. They have different qualities and each has its advocates.

3. Technique of Injection: The solution is injected at various places along the inguinal canal and around the inguinal rings beneath the fascia of the external oblique. The depth is identified by the feel of the needle as it pierces the aponeurotic tissues.

I have been giving about two injections a week until 12 are given, as a rule, and six more after a two or three month interval if the first series has not been effective. In my hands a repeated course has been necessary in about half the cases, but with more experience I believe the necessity for secondary courses will become less frequent.

COMPLICATIONS: 1. *Atrophy* of the testicle has been said to result from hernia injection. Those observers who have had experience with the method state that they have not seen it occur, but that atrophy is a frequent complication of hernia.

2. *Infection* is certainly a remote complication, no cases having been reported as far as I can learn.

3. *Tumor* will result from injection into the cord itself but this will almost wholly disappear.

4. *Death* has not been reported in any case in the now-growing literature on the subject.

5. *Necrosis* of the cord has been reported with the Thuja mixture.

INDICATIONS—CONTRA-INDICATIONS: Any reducible hernia which can be retained by a truss is suitable for injection. I need not point out to this group that I have a high regard for the effectiveness of operation. The method does, however, offer an alternative for those who refuse operation or in whom operation may carry an unusual hazard of death or of recurrence.

Recurrent hernias can readily be injected and are often hard to handle surgically.

RESULTS: I believe that any hernia suitable for injection can be cured with sufficient persistence on the part of operator and patient. In some cases persistence over many months may be necessary. Recurrence is probably no greater than after operation and has been rated as low as 3%, and can easily be handled by further injection.

I want to present the first two cases I injected beginning about two years ago, as extreme examples of bilateral indirect and bilateral direct herniae:

Case No. 1: Mr. K., a male widower, age 58, a truck driver. Was first seen April 2, 1935. He had had a scrotal hernia for 20 years and worn a truss. Examination revealed a right indirect inguinal hernia filling the scrotum, reducible, and a left smaller indirect hernia, reducible.

He was fitted with a truss and injections begun on April 9, 1935. The first course was completed June 1, 1935, another four injections were given in December and another course in May, 1936, and another in September, 1936. In September, 1936, he showed some bulge and impulse on coughing on the right. He has received some more treatments and worn a single truss during this time, for his bilateral truss does not hold his hernia well at all times. He still wears the truss while working but seems free of hernia now. The left side is cured. He is very appreciative of his result though incomplete, and had consistently refused any operation.

Case No. 2: Mr. S., an educator, male, 42, married. He had noticed bulging in the inguinal regions for years but had never had any symptoms until a few weeks before first seen, August 29, 1934. Then he had noticed a sense of weakness, with no real pain. Examination revealed bilateral direct inguinal herniae, large and soft with wide rings and weak musculature.

He had received 48 injection treatments, the last being in November, 1936, most of them being bilateral. His truss fitting was not entirely satisfactory and had to be altered. Today there is no visible bulge, but the rings are still rather wide and the muscles feel soft. He is reasonably comfortable, and thinks the last series has completed his treatments.

He is satisfied with his result. Operation in this man would have been difficult and prone to be followed by recurrent hernia because of his deficient musculature.

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Who Owns the X-Ray Negative?

"BUT IT'S MINE. I paid for it!" That, in effect, is the rejoinder made by many a patient when his physician politely but firmly refuses to part with an x-ray negative*

Persistent clients have gone so far as to point out that, under the law, a person who engages a photographer to take a portrait is entitled to the negative. However, the law has also indicated that in its opinion, x-rays are no more in the category of studio portraits than physicians are in the category of commercial photographers.

In a ruling, so excellent in its

*CHARLES R. ROSENBERG, JR., LL.B., in *Medical Economics*, July, 1937.

clarity and terseness as to warrant quoting at length, the Supreme Court of Michigan has settled the question of the ownership of x-ray negatives as follows:

"In the absence of agreement to the contrary, such negatives are the property of the physician or surgeon who has made them incident to treating a patient. It is a matter of common knowledge that x-ray negatives are practically meaningless to the ordinary layman. But their retention by the physician or surgeon constitutes an important part of his clinical record in the particular case. In the aggregate, these negatives may embody and preserve much of value incident to a physician's or surgeon's experience. They are as much a part of the history of the case as any other case record made. . .

"In a sense x-ray negatives differ little, if at all, from microscopic slides of tissue made in the course of diagnosis or treating a patient. It would hardly be claimed that such slides are the property of the patient.

"Also, in the event of a malpractice suit against a physician or surgeon, the x-ray negatives which he has caused to be taken and preserved . . . might often constitute the unimpeachable evidence which would fully justify the treatment of which the patient was complaining. . .

"There is every good reason for holding that x-rays are the property of the physician or surgeon rather than of the patient or party who employed such physician or surgeon, notwithstanding the cost of taking the x-rays was charged . . . as a part of the professional service rendered."[1]

The case which inspired that ruling was tried a little over two years ago and, as far as a thorough search of the records shows, the question of ownership of x-ray negatives has never before come before an apellate court.

There is every reason to believe that the Michigan decision establishes a precedent which will have a strong persuasive influence on the courts of other states.

Several factors not apparent in the ruling itself must have guided the court in making its decision. They are worth keeping in mind. Repeat them the next time you refuse to let a patient keep the picture of his once-shattered femur or diseased lung:

Since x-rays constitute a valuable record, they deserve the handling which you, not the patient, can give them. They must be filed in such a way as to protect them from fire, moisture, and dust, and in such order as to insure ready reference.

To a physician, x-ray negatives offer an opportunity to compare one with another portraying a similar disorder. Added knowledge thus gained may aid the diagnosis and treatment of the case under consideration.

Obviously, x-rays may be of extreme value if, later on, a consultation is found necessary.

In damage suits x-rays may play a feature role in winning the case for a patient. Therefore, it is important that the doctor keep them so that they may be readily available as evidence in support of a patient's claim.

1. McGarry vs. J. A. Mercier Company, 262 Northwestern Reporter, 296.

Woman's Part in Industrial Safety

WOMAN HOLDS a strategic and very important place in industrial safety.* This is true not only of the woman employed in industry but of the wife or mother of every employed person. She has a very real responsibility; yet, too often, she is unaware of it. The message of safety and the causes of accidents have not been forcibly enough brought home to her.

Employers were in a similar position some years ago. Accidents happened in great numbers in every kind of industry. They were considered bad luck, acts of God, and necessary evils. The entire cost of medical and nursing care, hospitalization, and loss of wages was borne by the injured person. The industry had no legal responsibility.

In 1911 the individual states began to pass what we know as workmen's compensation acts. These laws placed a definite responsibility upon the employer. It charged him with paying certain stipulated medical fees, and in addition he was required to pay the injured person a fixed amount of compensation.

The employer soon realized that accidents were very expensive. In an effort to minimize this expense to industry he hired a physician to spend certain hours at the plant daily, in order to dress the injured. A nurse was next added, as the employer saw the advisability of having someone in the plant, to give immediate first-aid attention to even the small wounds.

The keeping of records followed. The departments in which accidents occurred, the machines and operations involved, and the apparent causes of the accident were recorded.

The law then required that guards be placed on all dangerous machinery. This eliminated some of the deaths and injuries; nevertheless, the number of industrial accidents remained appalling. Far-seeing industrial leaders made some intensive studies of the causes of accidents. It found that 98% of all accidents were preventable and only 2% were unpreventable; that most of them were caused by ignorance, carelessness, poor judgment, lack of concentration, unsafe practices, mental or physical unfitness.[1]

Practically all of these causes have to do with the make-up of the individual. No matter how adequate the guards, how perfect the working conditions, how good the sanitation, they cannot overcome the danger to the industry of a person who is physically unfit or of one who habitually has a "take a chance" attitude.

Up to this time an injured person was often more or less proud and even defiant. His attitude was one of "Look what the company did for me." He assumed very little if any responsibility for the injury. With the new knowledge of the real causes of accidents the individual became the point of attack. Industry began a system of education of its workers. It proceeded to make them safety-minded. Foremen, keymen, doctors, and nurses were called into conferences which became safety committees. They formulated safe methods of doing work and plans for instructing their fellow-workers in safety.

Before long the attitude of the worker changed. He began to realize that an accident was a reflection upon himself, upon his judgment or his method of working. This changed point of view brought about a sharp reduction of accidents. In spite of the progress made, there still remained the injuries which were traceable to mental and physical unfitness. This group of causes, be they direct or indirect causes, are largely woman's responsibility.

The employer has made every possible effort to reduce the number of injuries. He has reduced the mechanical and work hazards; he has sponsored a system of safety education. The more progressive industries have gone even farther. Realizing that modern efficiency methods demand a perfectly healthy worker they have made a definite effort to overcome the mental and physical handicaps of their employees. To this end, medical departments with complete follow-up systems have been organized.

Perhaps the one person who exercises the greatest influence with the worker and his family is the nurse. It is to her that the worker tells his health, social, and work problems, and from her he expects sympathy, understanding, and help. Therefore, the nurse shares with the wife and mother the responsibility for the accidents caused by unfitness.

How is the nurse meeting this responsibility? She is usually stationed in the health office. Here she sees the injured. To them she teaches the importance of giving immediate attention to even the smallest of wounds and scratches, how to do it and why. By giving this prompt treatment and following up these cases she undoubtedly prevents many infections. An unusual number of cases coming from one department is called to the attention of the safety committee. The reason for this is studied and the cause eliminated if possible.

Workers usually come to the nurse to see about apparently minor illnesses such as headache, indigestion, constipation, and colds. Each one of these patients is in a receptive state of mind. Not only do they receive treatment (standing orders for which have been secured from the plant physician) to alleviate the particular symptoms of which they complain but the nurse makes inquiries regarding their habits of living which might cause these conditions. Too often the patient is entirely responsible. The history is frequently something like this: an evening of pleasure, excessive cigarette smoking, perhaps a drink, sometimes two, four, or five hours of sleep, a hurried morning toilet, breakfast gulped down, and a rush to get to work—followed by a headache or indigestion or both.

*JULIA A. WEBER, R.N., Industrial Nurse, Division of Safety and Welfare, Giant Portland Cement Company, Egypt, Pennsylvania, in *Public Health Nursing*, July, 1937.

[1]HEINRICH, H. W. "The origin of Accidents." Reprint from The Travelers Standard, Travelers Insurance Company, Hartford, Connecticut, 1928.

Another common picture is the one of fried potatoes and scrapple for breakfast, egg or meat sandwiches for lunch, and corn, potatoes, meat gravy, and pie for supper. That person will get the temporary treatment for which he asked but he will also get a lesson on the importance of balanced diet and the undesirable effects of habitual laxatives and purgatives. Do you see why the industrial nurse must be a health teacher? Teaching permeates everything she does if she sees her opportunities.

Not only does the nurse assist the physician in making the physical examinations but she assists the patient to have the defects corrected and to carry out the suggestions made by the doctor. Helping the patient to make a plan which is practical and which he can follow may tax the ingenuity of the nurse. Frequently this brings to light the hidden problems of the family.

Many industrial nurses make periodic visits to the families of the employees. Others visit only when their services are requested or when a worker is sick. In this way they learn of and can aid in solving many difficulties. Some do not make any home visits, especially when the employees' homes are widely scattered and the distances are prohibitive. In this case the nurse may refer the family to the local public health nursing agency for follow-up visits to help the family with their problems. These problems may be social, involving a sick or handicapped member of the family; financial, which so often can be remedied by working out a budget; or work problems which can usually be eliminated by getting the coopertion of the employer.

We know that a person whose thoughts are upon his troubles at home is unable to concentrate upon the work he is doing. He is a definite menace to himself and his follow workers. No matter how much service the nurse and the social agencies of the community are willing to give, or how cooperative the employer is, if the wife or mother does not do her part, mental and physical unfitness cannot be eliminated.

What can the woman in the home do to meet this responsibility? First, by her favorable attitude she can promote the cause of safety. She must believe in it; acquire a safety-mindedness herself. She can profit by the experiences of the employer and follow his example in providing a healthful environment. First, she can make the home a safe place in which to live. Then she can improve the conditions under which she works, and see that there is adequate ventilation, that there is good and sufficient light, that a proper temperature and an adequate amount of moisture in the air are maintained. After she has perfected her home working conditions insofar as her facilities permit, she can eliminate all hazardous practices and formulate safe methods of doing her work. Last, but by no means of least importance, is the matter of education of the individuals in the home in regard to their habits of living.

In the past few years we have acquired a health consciousness. Our periodicals have persistently taught us health subjects. Pages are regularly devoted to foods and their values, to health habits, and the scientific upbringing of children. Our responsibility toward the mental and physical welfare of ourselves and our families has constantly been held before us. In reality we have accumulated an enormous amount of health information and knowledge. We must put this to practical use.

We must show by our actions and our attitudes that we believe in positive health. We must encourage our wage-earners to have physical examinations. Too often workers resent pre-employment and follow-up examinations. We should support this practice! We should urge the correction of all defects; help in every possible way to carry out any suggestions made to remedy faulty health habits; and constantly foster a sense of pride in perfect physical condition and a desire to maintain it.

Woman holds a crucial position in the safety movement and her influence cannot be overestimated. She must accept this tremendous responsibility and make of it an opportunity to do a real constructive piece of work in the field of accident prevention.

Salt Prevents Ill Effects of Heat

A SERIOUS problem to many of the important industries of the country is the effect of extreme heat on employees.* In mills and factories where of necessity high temperatures exist the problem of heat cramps and heat prostration is especially acute. Cramps and prostration, however, are frequently met with in the hot months of summer where workers are unprotected from the direct rays of the sun, and, for that matter, in mills where the temperature is lower than that of the outside air.

The use of salt as a remedy and preventive measure in such cases is several decades old, but only recently has its effectiveness been scientifically proven by successive trials. One of the most recent and thorough investigations of the value of salt as a heat prostration preventive was made by the Fatigue Laboratory of Harvard University, conducting its experiments both at home and in the field. More than five years was spent in gathering data on the physiological and pathological effects of high temperature on workmen. After studying the working conditions in the hot humid climate of the Panama Canal Zone, investigations were begun at Boulder Dam, a region equally hot but dry. It was noted during the first few days that a man was subjected to the extreme heat a loss of body weight occurred as a result of a loss of body fluid through the sweat glands. In this way not only water but also a substantial amount of salt was lost from the body. The resulting heat cramps were in many cases so painful that during the summer of 1931 several workmen on the Boulder Dam project jumped into the treacherous Colorado River.

The next step in the investigation of heat effects was made at the Youngstown Hospital in Ohio, where a great number of workmen were suffering from the ill effects of heat. Of the 12,000 men employed in the Youngstown district in 1934 between May and September, more than 100 were hospitalized because of heat prostration. Assuming the same proportion throughout the country, more than 2000 men in iron and steel mills were in hospitals in 1934 for this reason.

At Youngstown it was discovered that in the blood of the victims of heat cramps, dehydration and diminished concentration of salt existed. The workmen engaged in strenuous activity, perspiring profusely, naturally drank a great deal of water to quench their thirst. This merely served to dilute their salt reserve more seriously, and in many cases heat cramps developed. For the treatment of this illness restoration of the sale reserve proved to be the only necessity.

Dr. Arlie Bock, who is connected with the Harvard Fatigue Laboratory, had charge of these investigations at Boulder Dam. He suggests that a worker, working eight hours a day under extreme heat should use plenty of table salt with his food and also should take five or six one-gram tablets of salt, enteric coated to prevent dissolution before the tablet leaves the stomach.

The use of sodium chloride (salt) for such purposes is now new, for it has been through the application of the knowledge of its efficacy that it has been possible for stokers on ocean liners to stand the terrific heat of their working environment.

In the *Hartford Courant* of July 11, 1936, this article appeared indicating the widening application of this principle: "Salt tablets solve prostration problem. Since salt tablets have been made available several automobile plants have not had a single case of heat exhaustion. The tablets, each containing one teaspoonful of pure sodium chloride, are available at drinking fountains in many of the factories. They are swallowed whole, followed by one or more glasses of yater. Holding the principle cause of heat exhaustion is the loss of salt from the blood stream through profuse perspiration, Dr. E. R. Harris, physician at the Cadillac Motor car plant, is urging shop workers to take from 10 to a dozen of the salt tablets daily."

Wherever salt therapy has been tried it has proven successful. Within a few years it is to be hoped that in all mills and factories where extreme heat is a necessary working factor, provisions will be made to supply salt to workers, either in tablet form or in the drinking water. So simple a method of lessening human pain and maintaining working efficiency should not be overlooked.

Salt in tablet form is readily available in most communities. The tablets may be purchased in bottles which fit handy dispensers. The cost of the salt and of the dispensers is so little that it should not be a factor in any situation. Usually the dispensers are placed near drinking fountains together with a reminder to employees to use the salt.

* HENRY C. MARBLE, M.D., Surgical Director, American Mutual Liability Insurance Company, in *American Mutual Magazine*, June, 1937.

Because only a limited number of workmen who have not used salt in their experience are aware of its protective effect, plant managers may find it necessary to make provision for employee education on the subject. Once the purpose of salt is understood, however, few workmen will require urging to use it.

Roll-Call!

CHICAGO papers of Saturday, July 24, 1937, had the following:

"DR. FRANK W. BAYLOR, Chief Surgeon for the Yellow Cab and Chicago Motor Coach companies, was injured fatally yesterday in an automobile accident near Lebanon, Indiana. In the automobile with him were a son, Wesley, 16 years old, and their chauffeur, John Johnson, 621 Waveland avenue. Both were injured.

"The Baylors were en route to Dr. Baylor's farm at Georgetown, Indiana. The son was driving while the chauffeur was resting on the back seat. Wesley lost control of the car, according to reports to Lebanon police, which rolled over three times and landed upside down in a field.

"Mrs. Adrena Baylor, the widow, was at the Baylor home at 3800 Lake Shore drive with their older son, John, 18, a Princeton University student. She flew to Lebanon with an associate of Dr. Baylor, and an ambulance was sent from Chicago to bring the chauffeur back for treatment. The son was not seriously hurt.

"Dr. Baylor, who was 54 years old, was born in New Albany, Indiana. He was an Attending Surgeon at the Alexian Brothers, Henrotin, Chicago Memorial, and Columbus hospitals, and a fellow of the American Medical Association. He had practiced in Chicago for 30 years.

"In 1933 and 1934, he was head of the emergency hospital at A Century of Progress exposition. His office was at 166 West Van Buren street."

AND the papers of the following day, Sunday, July 25, 1937:

"DR. LEROY PHILIP KUHN, 58 years old, surgeon and author of several medical treatises, died yesterday of a heart ailment in his summer home at Three Rivers, Michigan. He resided at 3644 Lake Shore drive.

"Dr. Kuhn was Chief Surgeon of the Lumberman's Mutual Casualty company and chief of the surgical staff at the Lutheran Memorial hospital. He was a past president of the Institute of Traumatic Surgery and a fellow of the American Medical Association and the American College of Surgeons. During the world war he served as a captain in the medical corps.

"Surviving are his widow, Mrs. Grace Kuhn; two daughters, June and Mrs. Katheryn Kneip of Evanston, a grand-daughter, and seven brothers and sisters."

Legal Responsibility in Industrial Medicine

TWO interesting decisions have been recently announced on the responsibility when a worker selects his own physician to care for an injury received while engaged in his usual factory occupation.* In one case the treatment given the worker aggravated the injury and a suit was brought to determine whether the physician or the employer was responsible. According to the law of 1908, an injured worker has the right to be treated by any physician whom he chooses.

The two courts before which this test case was brought rendered practically identical decisions. The court at Beziers, Nov. 20, 1934, decided an injured worker is not able to claim damages from a physician for any malpractice that has made the injury worse because of unskilful treatment. It is impossible, according to the decision, to distinguish between the effects of the original injury and those resulting from improper care. The latter must be considered as a direct and immediate consequence of the accident; hence such sequels must be paid for by the employer or his insurance company.

In the second test case, the question submitted was whether the employer (or his insurance company) could claim damages from the attending physician for unskilful care of an injured employee. The Nantes court decision denied the responsibility of physicians under such conditions. A physician called to care for a patient injured in an industrial accident cannot be considered as liable either to the employer or to the employee. The physician's care of such an accident cannot be dispensed with and the law has provided for its being given to an injured employee. The latter has the right to choose his own medical attendant for an industrial accident; hence the surgical or medical care constitutes an indivisible entity with the accident and its consequences. As a result, the employer or his insurance company is not entitled to bring action against the employee's physician even though the treatment has not conformed with what the law considers reasonable care and skill.

* Paris Correspondent, *J.A.M.A.*, July 17, 1937.

Interesting Paragraphs!

"A SUIT has recently been filed by the relatives of a deceased worker who had been employed in a brass foundry. The basis of the suit, among other things, is that the worker was exposed to fumes in the brass foundry which caused or helped to aggravate a heart condition, as well as caused or helped to aggravate a condition of arteriosclerosis."

"THE Workmens Compensation Act (New York) has been amended to increase the amount of benefits payable to an employee disabled by silicosis or other industrial disease. The increase of benefits requires an increase in the amount of premium. The foundry class rate has been increased from $0.98 to $1.48. A schedule rating plan has been adopted for foundries. This plan will allow a credit resulting in a lower premium for those plants where protective appliances are installed and the operations are conducted according to standards set forth in the plan. The full compliance with the standards entitles the employer to a 35% reduction in the occupational disease rate. This would reduce the new basic rate of $1.48 to $0.962, which is below the present rate."

"IN A propaganda pamphlet by Stuart Chase, Henry Pratt Fairchild and Harry A. Overstreet, entitled 'Rich Man, Poor Man,' for which contributions to aid its free circulation are solicited, one of the most familiar errors with regard to medical care is published. In text and illustration the public is told that in an average year more than half of our people receive no services from a physician. This is offered as proof of the fact that there is 'not enough medical care.' It would seem that men who have gained a reputation as economists and socialogists should have been able to learn from the investigations that have thus far been made that only about half of the population is sick during the year and has any need of medical care. These investigations have shown also that about 47% of the population does receive medical services. It does not appear that more than 5% of the people who are presumably in need of medical attention do not receive such care."

"THERE are about 15 million workers in manufacturing, mechanical and mineral industries in the United States. The control of occupational diseases in this group is quite a public health problem and can be met. Medicine and public health, broadly speaking, are greatly advanced in scientific knowledge and skill. There are many men of ability in the profession; nevertheless, they are backward in the application of this knowledge and skill to the problems of today. We know of methods of control, and even of elimination, of many contagious as well as occupational diseases. Yet they continue to occur. Mr. Hastings has asked, "Why do we spend $15,728,925,396 annually for treatment and care of the sick, and lost wages, and spend less than one-half of one per cent of this amount for prevention?" New York State spent $531,808 for compensation in 1934. The per worker cost for industrial hygiene during the fiscal year 1936-1937, which is allotted for 21 states having over 19,000,000 employees, is $0.015. This is a very small amount for the many industrial health problems that exist, but will yield a return much greater in proportion than the amount spent. The states can, and will, greatly aid in further reduction of the incidence of tuberculosis with their programs of industrial hygiene, which, incidentally, is a good example of how knowledge can be applied in the control of disease. In the past, only a few states had taken steps to assist industry to control its hazards. At present, there are 21 industrial hygiene units in states, most of which were established since the passage of the Social Security Act, which provided funds for such work. Plans are under way to establish several more, which will include more than one-half of the states and approximately 84% of the industrial population. We have good reason to expect a marked reduction in the incidence of tuberculosis in industry through the control of harmful industrial dusts."

THE *Monitor*, official publication of Associated Industries of New York State, in its issue of June, 1937, has this, under the caption: "Reports New Silicosis Treatment:"

"A NEW method for the possible prevention of silicosis, described as 'the most outstanding contribution in the history of silicosis research,' was reported recently by the Canadian Academy of Medicine. A brief Academy statement said that research work done at the Banting Institute and the McIntyre Mine at Schumacher, Ont., promises prevention of the incurable and costly industrial diseases by pathological means. Methods used up to the present have been mechanical. The Academy report cited a theory that dust breathed by workers dissolves in the lungs, resulting in the chemical degeneration of the organ. Experiments were made with rabbits, placed in a box containing dust particles of quartz and metallic aluminum. Pathological examination of the animals revealed the metallic aluminum inhaled with the other dust had saved the lungs from injury by the quartz."

"MORBID FATIGUE should always be suspected when a person looks tired, is heavy-eyed, yawns, moves slowly, droops at the shoulders, and drags his feet. A typical example was seen recently in a boy of 15 years of age who was employed in a dairy. His mother was dead and his father a seafarer. He lived in a working boys' home. He was called at 5:00 o'clock each morning, including Sundays, but, owing to the conditions at his place of residence, had no opportunity for rest during the day, and could not be asleep before 10:00 p.m. At 9:30 a.m. he was yawning and heavy-eyed. The most exacting physical examination in such cases reveals no indication of recognised disease. Such patients are, however, clumsy, liable to accidents, inattentive to instructions, irritable in temper, and very apt to take offence. A girl, 28 years of age, a cinema attendant, had been liable to attacks of loss of voice, which she described as 'being too tired to talk.' One day she tried to go to work but collapsed, and after this felt weak and complained of tremblings, twitchings, light-headedness, poor sleep and headache. On examination there was no evidence of organic disease, but the girl was found to be in a state of complete exhaustion. She was the only child of a delicate and neurotic mother. For 10 years she had taken sole responsibility for the care of the home and had also followed her employment, which had occupied her until 11:00 p.m. Such cases require months of complete rest to restore the reserve energy which has been sapped over a period of years. A similar case seen recently was that of a domestic science teacher who undertook the work of the home prior to, and after, her school duties."

Advertising

THE Journal* is heartily in accord with the thought of the following editorial, clipped from the house organ of Eli Lilly and Company. The attention of the members of this Society is called to this exposition of the relationship existing between an honest, ethical manufacturer and the physician. The attitude here expressed is in marked contrast to that of the "throw-away" medical magazines, deriving their support, in large part, from manufacturers of dubious merit. In common with other reputable medical publications, The Journal of the Arkansas Medical Society accepts only such advertising as bears the approval of the Council on Pharmacy and Chemistry of the American Medical Association. This policy has proved its worth, bringing to the attention of our readers only the claims of those manufacturers who are ready and willing to cooperate with the Council in the introduction and in the continued manufacture and sale of medical products. As a matter of sound business policy and for the best interests of the Arkansas Medical Society and its official Journal, we urge that you reciprocate with the ethical firms who have demonstrated a willingness to cooperate with us, not only by the purchase of advertising space, but who have through the years evidenced that the welfare of the medical profession is a prime consideration with them.

Waste?

THE thought must periodically occur to every physician that pharmaceutical companies employ diverse methods of approach to the medical profession. Leaving out of account such companies as might perhaps be thought to oppose the function and social service of the doctor by directing promotional efforts on their products toward the lay public, there is an illustrious group of pharmaceutical houses in this country, a number of which are so well established that their founding is beyond the personal memory of this generation of physicians. These pharmaceutical manufacturers are frequently referred to as the "ethical" houses. The message which these pharmaceutical manufacturers have for the medical profession is conveyed in many ways but rarely is "cried aloud from the housetops."

Advertising through the medium of the recognized medical journals is perhaps the most commendable approach now available. Not only are these journals as much concerned with maintaining the professional place of the physician as is the physician himself, but the financial support which is lent the journal by the advertising within its pages may be of considerable aid in combating that bete noire of all publication efforts—a disproportionately high overhead expense.

There are other ways and means. One of them is costly—so expensive as to preclude its general use by any but those companies which enjoy the confidence of the medical profession to an unusual degree. A personal representative from the pharmaceutical company may call upon the doctor. But why? To the physician, his office hours form the basis of his livelihood. They are the hours which represent dollars and cents value. The only logical reasons which he may be expected to accept for giving of his time are those which involve an unusual personal satisfaction or the expectancy of receiving something which may be useful and which is, therefore, potentially valuable. This is the method upon which Eli Lilly and Company has pinned a large part of its hopes of maintaining old friendships with the physicians of this country and of cultivating new friends.

Perhaps the commonest means of attempting to gain the attention of the doctor is the advertising circular. Direct mailing would today be the most abused method of advertising to the medical profession if the physician paid a disproportionate amount of attention to the flood of form letters or pamphlets which is directed at him in each day's mail.

To every pharmaceutical manufacturer comes he who advertiseth advertising. Rapidly he discourses upon "coverage," the "accuracy" of the mailing lists in his possession, the 'waste" of one or another kind of advertising. To Eli Lilly and Company there is only one unforgivable 'waste" in advertising and that is the waste of the doctor's time. Long years of experience have proved to us that if we have something worthwhile for the doctor, it is worthwhile from his standpoint and from ours to talk it over with him. The only exception is this Bulletin which is placed in your hands through the mails to insure uniformity of delivery. Many of the facts contained in it will come to your attention in the advertisements in the medical journals. Most important of all, a representative of this company has been instructed to call upon you at regular intervals. He will be glad to supply literature dealing with our products if you wish to have it. Questions which he cannot answer, he will be glad to convey to our Research Laboratories.

Racket!

THE attention of The Journal has been directed to a form letter mailed by an Arkansas insurance company which offers the lucrative appointment of medical examiner provided the physician addressed purchases $1,000 of insurance and subscribes for $500 of stock in the company.* For years we have been an earnest advocate of life insurance for the professional man. We certainly do not think a $1,000 policy a burden. With the echoes of the depression and the memories of certain stocks with which we packed our safe deposit vault not undimmed in our consciousness, we unhesitatingly offer a bit of investment advice—put this $500 in fishing tackle, golf clubs, a new car, a roof on the house, a gold-plated bath tub, air conditioning for the office, or in any wise or unwise expenditure which you may contemplate, but let someone else buy that insurance company stock. We thought the medical directory racket at $10 for your name in a little book quite a good scheme; $500 for appointment as an examiner strikes us as a new all-time high Either prosperity has returned, or there are some individuals outside the walls with delusions of grandeur. Five hundred dollars from a doctor of medicine for insurance company stock! The next time we are in Little Rock we are going to sell Broadway bridge to a syndicate of physicans who are the examiners for this company.

* Editorial, *The Jounal of the Arkansas Medicat Society*, June, 1937.

* Editorial Comment, *The Journal of the Arkansas Medical Society*, June, 1937.